

THE  
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of THE HITOTSUBASHI ACADEMY

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HITOTSUBASHI UNIVERSITY  
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Japan

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## HITOTSUBASHI UNIVERSITY

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# THE ANNALS OF THE HITOTSUBASHI ACADEMY

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## IN CELEBRATION OF THE EIGHTIETH ANNIVERSARY OF HITOTSUBASHI UNIVERSITY

Hitotsubashi University is celebrating in October of this year the eightieth anniversary of its founding. Its original shape was a small private institute called "Institute for Business Training" established in 1875. In 1884, the institute came into governmental operation under the name of "Tokyo Commercial School." The name was successively changed to "Higher Commercial School" in 1887, to "Tokyo Higher Commercial School" in 1897, and to "Tokyo University of Commerce" in 1920, and then during World War II to "Tokyo University of Industry." Needless to say, with names changed, the institution itself grew in work and size. The present name of Hitotsubashi University was selected anew when our University made the remarkable restart in 1949, with the four faculties of Commerce, Economics, Law and Social Sciences newly instituted, in line with the reform of the university system of this country after the War. At present, the University, with a graduate course for each faculty and the Institute of Economic Research directly attached to it, holds a unique position as a general university of social sciences in Japan.

The history of Hitotsubashi University is at the same time the history of the economic society of Japan. Though in fact the Institute for Business Training came into existence chiefly out of necessity in carrying on foreign trade, it was exactly what the economic condition in those days of early Meiji needed. In the period from the Commercial School to the Higher Commercial School, the educating of captains of industry was the aim. It may be taken to signify the need of the rising Japanese capitalism in the early part of the present century. Since it became the University, the aim spontaneously shifted from the practical to the academic side. Accordingly, the study of economics, laws and business administration became the center of interest and importance was given to the methodology of social sciences.

This was logically because the Japanese society at length came to step on the new level of culture. The disastrous war brought about tremendous changes to Japan. But the new makeup of Hitotsubashi University is heartening as the crystalization of efforts to answer the challenge of the country in her course of reconstruction after the War.

The mere lapse of eighty years is never what one may boast of as the life of a university on a world level. However, granted the modernization of Japan started with Meiji Restoration (1868), this history of eighty years coincidentally covers about the history of the modern culture in Japan. If the significance of economic and social changes taking place during the while is fully evaluated, the period may count for as much as several hundred years of some other country. In the course of the eighty years, the population of Japan increased to twice and a half. National income went up more than ten times. Education spread so thoroughly that illiteracy hardly remained. They certainly proved phenomenal development. But, on the other side, the quick growth was accompanied by numberless difficulties and hinderances. The gap between the living standard and the production standard widened. Population pressure enlarged the peril of hidden unemployment. Progressive culture had to battle with the persevering feudalism. The history of eighty years was, in a word, a history of battle against the contradiction born of development. The history of a school makes no exception. While our institution grew larger, changing in name and structure, we had to overcome numbers of difficulties. Financial difficulty was one. It persisted even after the institution came into the care of the state. Administrative difficulty was another. The root of the difficulty, it must be pointed out, lay in the outmoded feudalistic idea that commerce and economics are no matter of academic study. The institution had successful battles with these difficulties and today has established itself on an immutable position. But it is not that all the difficulties were removed. As long as Japan has to remain at grips with the growing contradiction of development, it may be imperative that all Japanese universities should courageously face the challenge of the problem. We are aware of our difficulties. Nevertheless we are not frustrated. In order to attain the ideal of Japan as a cultural state, let us pledge ourselves, fully conscious of the increasing importance of the jobs universities should undertake, to expend more efforts for realization of the purpose of our University centering on freedom and independence.

Ichiro Nakayama

*President, Hitotsubashi University*



# CAUSAL PROBLEMS IN FIRE AND MARINE INSURANCES

By YOSHISAKU KATO

*Professor of Insurance*

## I. *The General Theory on Causal Problems*

We shall be concerned in this paper with the clarification of the differences, which are in existence with respect to the principles of causal relations between the insurance for individual risk, such as the fire insurance, on the one hand and that for universal risk, such as marine insurance, on the other. We shall however confine ourselves here in this paper to the causal relations between perils insured against and damages, which all nevertheless only a part of many other causal relations concerning insurances. It is further to be remembered that there are two different problems with respect to the causal relations between perils insured against and damages. One is the problem, to what extent the insurer should indemnify the insured when combined damages occurred. The other is the problem to select one peril as the real cause of the damage out of more than two perils, which are all seemingly responsible for the damage. In this paper, the author will mostly be concerned with the latter problem.<sup>1</sup>

The concept of causal relations is by no means peculiar to jurisprudence being common to both natural and spiritual sciences. It is therefore required to apply this fundamental theory of causal relations throughout jurisprudence in general. This requirement is of course under restriction, when the purpose of the theory is not in accordance with the requirement. The same situation prevails in the causal relations in the insurance law. In fact, there is no reason to apply to one and the same theory to the field of fundamental laws as well as to that of insurance laws, which constitute a special field in jurisprudence.

In order that a fact (peril) be the cause of another fact (damage), it is necessary that the former be at least a condition for the occurrence of the latter fact, which is the consequence of the former. The condition here means the totality of the facts, (condition sine qua non), the non-occurrence

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<sup>1</sup> The former is the problem to be taken care of by the theory of insurable interest, while the latter is properly dealt with by the theory of causal relations. (Cf. Yoshisaku Kato, *Theory of Damage in Marine Insurance*, (in Japanese) 1933, p. 17.)

of which would not cause the effect to take place. In other words, there should not be any causal relation, if the same effect would take place without the cause in question. Sometimes, the existence of such conditional relations are easily observed, but sometimes it is not. For instance, the death of a family member, which took place as a result of the shock caused by the death of another family member on a trip, is clearly the effect of the death of the latter and we can easily find the conditional relation existing between these two deaths. On the other hand, the cause is not easily traced, for instance, of the death after an operation, or the shipwreck, which took place after a certain action on the part of the captain. In fact, it is by no means easy to establish a conditional relation between the operation or action and the death or shipwreck. In such cases, the experts (doctors or.....shipping operators) are entrusted with the decision about the existence or non-existence of any conditional relation. Such a method to establish a causal relation by means of a conditional relation between facts is one of the most fundamental ways of reasoning throughout all sciences. It is therefore to be employed in jurisprudence as well. It is called the theory of condition sine qua non. However, the overall employment of this method is not feasible in general, because the above-mentioned conditional relations come into existence sometimes quite by chance and there is no end in the chain of cause and effect. Therefore, if a fact among others should happen to have originated from the wilful misconduct or negligence on the part of the insured, the insurer would not be responsible for indemnification of the damage, which would occur as a result. However, such a thing is far from being the actual situation of insurances.<sup>2</sup>

On the other hand, the indemnification for accidental happenings would have the effect to overly extending the responsibility for indemnification making the management of the insurance business more than difficult. Such being the case, the fundamental theory of causal relations is applicable neither to the indemnification in civil codes, nor to that in insurance laws. Many contemporary theories therefore attempts to place some restriction upon such indemnifications. Nevertheless, the theory of adequate causal relations is the most important of these theories.

Contrary to the so-called condition theory, which determines the condition for the result in each case, the theory proposes to determine such a condition by general observations.<sup>3</sup> By general observations, we mean that a large number of observations are made in order to ascertain the resulting effect in the presence of many facts (conditions), which are connected with

<sup>2</sup> Suppose, the insured has a dispute with another person, who set fire on the insured house in excitement, the insurer is not responsible for the indemnification, according to this theory.

<sup>3</sup> Träger, *Der Kausalbegriff im Straf- und Zivilrecht*, 1904, S. 38 ff.; Hatoyama, *Japanese Laws of Credits (General Theory)*, (in Japanese) p. 61.



each other.<sup>4</sup>

If the conditional relations between facts are established in a more general way like this, the relations thus established are free from the effect by chance than those obtained with respect to concrete cases. It is therefore a highly adequate theory of causal relations in dealing with legal relations in our everyday life. In one of the above examples, the death of a family member on a trip is clearly the cause of the death of another family member at home, who was shocked by the death of the former, if we confine ourselves to this single concrete case. However, such a causal relation can not be found in general. In a word, the difference between this theory and condition theory only lies in the fact that the former tries to establish the conditional relation with respect to concrete and real facts, while the latter is interested in the conditional relation in general. As this theory is generally called "Theorie der adäquaten Verursachung", the word "adequate causal relation" is suspected of some particular connotation. Nevertheless, there is no such thing other than the above-mentioned. It is therefore not correct to recognize the adequate causal relation, only where a effect occurred as the inevitable or natural consequence of the happening of some facts. Even in cases of unnatural consequences, adequate causal relation may be recognized.<sup>5</sup> Suppose, for instance, that some movable properties are left alone without any shelter taken away from a burning house and are damaged as a result, or a ship is heavily damaged as a result of a fire, which was started by a spark generated by the collision of a crane with the ship's side. The damage of the movable properties or the fire of the ship are by no means the inevitable or natural result of the fire or the fall of the crane. But they can be called as their general effect. This theory will be taken up again in the sequel in reference to the difference between the theory of adequate causal relations and that of natural consequences.

## II. *The Theory of Causal Relations in Fire Insurance*

The theory of adequate causal relations is most prevalent in jurisprudence in Japan, in particular, in the theory of civil law as the most popular theory concerning causal relations. It is not effectively employed in dealing with the damage insurance law. In case of the fire insurance law, our jurists are almost without exception in agreement with each other about the validity of this theory. However, there are some exceptional jurists,

<sup>4</sup> Kisch maintains in this connection that statistics is one of the main sources of empirical laws (Kisch, *Zum Kausalproblem im Versicherungsrecht*, 1926, S. 27).

<sup>5</sup> Träger, loc. cit., S. 471.; Ishizaka, *Japanese Civil Codes*, (in Japanese) Chapter 3, *Credits*, Vol. 1, p. 300.

who are not in agreement with the majority.<sup>6</sup> The author himself is of the opinion that this theory should be called for in determining the responsibility on the part of the insurer for the indemnification in case of the insurance against single risk. (Insurances such as marine and transportation insurances are called the insurances against universal risk.) The author is however not in agreement with majority jurists about the ground for its adoption. In particular, he has come to the conclusion opposite to that obtained in accord with the said theory, when precedents are about fire insurance. We shall be concerned in the sequel more in detail with the problem, which was taken care of by the precedent. We however wish to say one word about the problem. The adoption on the part of many jurists of the theory of adequate causal relations in the study of the insurance law is merely originating from the fact that the said theory is most generally accepted in the study of the private law being the principle of indemnification in the civil code and most of the advocates of this theory do not take trouble of assuring its adaptability to the peculiar situation in the insurance law. Even if the indemnification is provided for by the Article 416<sup>7</sup> of the Civil Code and the theory is the principle which governs causal relations to be dealt with by the private law, we are by no means forced to follow the theory, as has been mentioned above.<sup>8</sup> We shall therefore be concerned in the sequel with the criticism of the precedents of the Supreme Court as well as with the applicability of the theory with respect to the damage insurance law and the ground of its applicability, if any.

According to the precedent of the Supreme Court concerning fire insurance, the insurer is responsible for the indemnification, as far as the damage is in an adequate causal relations with the fire, even if the former is a consequence of an explosion caused by the latter. According to the Article 666<sup>9</sup>

<sup>6</sup> Doctrine of *causa proxima* is advocated by Dr. Nozu for the theory of adequate causal relations with respect to damage insurances. (Cf. Nozu, *The Theory of Insurance Contract Law* (in Japanese) p. 301.)

<sup>7</sup> The Article 416 of the Civil Code.

The object of the request for an indemnification is the indemnification for the damage, which takes place as a usual result of the failure to meet obligations. Even if a damage takes place as a unusual result in a special situation, the creditor has the right to demand the indemnification, when those concerned can or could foresee the said situation.

<sup>8</sup> In his book cited above, Dr. Nozu further maintains that the principle of indemnification in the Civil Code does not prevail any more in the damage insurance law, there is nothing common to these two kinds of indemnification. Although the author believes, the same principle prevails, at least, with respect to fire insurance, his theory seems to the author of much use in some other fields. (Cf. the chapter on the causal relations in marine insurance).

<sup>9</sup> Article 665 of the Commercial Code: The insurer is responsible for the indemnification for the damage caused by a fire, whatever the cause of the fire may be. However the insurer is not responsible for the indemnification, in the case provided for in the Articles 640 and 641 of the Commercial Code.

The Article 666 of the Commercial Code: The insurer is responsible for the indemnification of the damage, which is a consequence of refuge or fire protection.



of the Commercial Code, the insurer is not responsible for the indemnification of the damage indirectly caused by a fire, except in case the damage is a direct consequence of refuge or fire protection.<sup>10</sup> The above-mentioned precedent however ascribes the damage to the fire, because both the fire and the explosion could be the cause of the damage and recognizes the responsibility of indemnification on the part of the insurer.<sup>11</sup> According to the theory of adequate causal relations, the risks which come into such a relation can all be the cause of the damage in question. So seemingly the precedent of the Supreme Court is not without ground. In reality, it however involves a serious contradiction. In fact, the responsibility on the part of the insurer for the indemnification could not be decided theoretically, if both fire and explosion were the cause of the damage, the former being the peril insured against, and the latter being another peril not insured against.<sup>12</sup> In other words, the insured would be unable to demand the indemnification for the damage, from the viewpoint of the adequate causal relations theory, as far as we confine ourselves to causal relations.<sup>13 14</sup> We are thus led to the conclusion, which is just opposite to the afore-mentioned precedent of the Supreme Court. However, the better understanding of the very nature of fire insurance and the improvement of the theory of causal relations by means of it seems to be a prerequisite for the final solution by means of the principle of demonstrable responsibility.

In single risk insurances, such as fire insurance, the risk insured against is supposed to be more important, while other risks resulting from it is

<sup>10</sup> According to some students, the Article 665 only stipulates the responsibility of the insurer for the indemnification of the damage, which is a direct consequence of the fire, while the responsibility for the indemnification of the damage which is resulting indirectly is not provided for in the Article except the case provided for in the Article 666. (Cf. Nozu, loc. cit., p. 302, Takeda, Collected Papers on Jurisprudence, (in Japanese) Vol. 3, p. 158.) In the majority opinion, the former provides for the responsibility on the part of the insurer for the indemnification of the indirect damage, while the latter imposes a restriction to the application of the former against the literary interpretations. (Cf. Kato, *The Theory of Fire Insurance* (in Japanese) p. 127, Takitani, *Studies on Insurance*, (in Japanese) p. 169, Minaguchi, *The Insurance Law*, (in Japanese) p. 582, Aoyama, *The Insurance Contract Law*, (in Japanese) p. 150.) From this interpretation of the Article 665 of the Civil Code, Dr. Nozu concludes that *causa proxima* is at the foundation of the theory of causal relations in our insurance law. The author does not however agree with him with this respect.

<sup>11</sup> The decision on 31 May, 1927.

<sup>12</sup> Kisch, loc. cit., S. 46.

<sup>13</sup> Kisch, loc. cit., S. 48.

<sup>14</sup> In case of the indemnification provided for in the Civil Code, i.e. the indemnification resulting from the failure to meet one's obligation or from the unlawful act, the indemnification is of a disciplinary nature. Therefore, all the conditions, which are in adequate causal relations to the effect, are supposed to be the cause of the said effect. (Refer to loc. cit., Article 416 of the Civil Code.) In case, the insurer is responsible for the indemnification of the damage as his business, we can not adopt the theory of adequate causal relations, as far as we are unable to uniquely determine a cause. (Refer to Nozu, loc. cit., p. 301.) Fortunately, we are in a position to uniquely determine the cause in case of the insurance against a single risk such as fire insurance. From such a point of view, the theory is advocated for its application in fire insurance.

taken care of as secondary. In case of fire insurance, the risk insured against is respectively the fire. Further, such an observation is well in accord with the economic significance of the insurance. Therefore, in whatever way a fire may cause the damage, independently or helped by an explosion or other perils, or indirectly in connection with other perils, the insurer should be responsible for the indemnification of the damage, if the full effect of the insurance should be developed. Such an idea is also well in accord with the original intention of the contractors. This is further the reason why in the Article 665 of the Commercial Code, it is stipulated, "The insurer is responsible for the indemnification of the damage, caused by a fire, in whatever way the fire may happen." But as to the indirect result of a fire, in view of the real state of affairs of our fire insurance companies, the responsibility provided for in the above-mentioned Article 665 is restricted to the case of refuge and fire protection in order to reduce the responsibility on the part of the insurer. (Article 666 of the Commercial Code.) At any rate, the prevalence of the risk insured against other subordinate minor risks gives rise to an ordering of the risks, all of which are supposed to constitute equally the causes of the damage according to the theory of adequate causal relations. We are therefore free from the contradiction, which might take place in connection with the priority of the responsibility on the part of the insurer. These secondary risks are so-called neutral facts and are not supposed to constitute the cause of the damage.<sup>15</sup> But in case such secondary risks are specially excluded from the liability of the insurer legally or by the contract, whether the main risk (e.g. fire) induced by the secondary (e.g. explosion), or the latter induced by the former, the main risk can not be considered the one insured against any more as a case of limitation of risk (causal or consequential limitation) and shall be discharged from the liability for the indemnity of the loss caused by such risks. Summing up, the responsibility on the part of the insurer is solely determined by the main risk, which is in limitation in the above-mentioned sense. Thinking in this way, we come with respect to the afore-mentioned precedent of the Supreme Court to a different conclusion in spite of our reliance on the theory of adequate causal relations and the insurer is not responsible for the indemnification, at least, in author's opinion.<sup>16</sup>

<sup>15</sup> Kato, *The Theory of Fire Insurance*, (in Japanese) p. 131.

<sup>16</sup> In this case, the fire and the explosion (excluded risk) are supposed to be two different entities by the precedent of the Supreme Court. Furthermore, only with respect to the former, the precedent recognized the responsibility on the part of the insurer. In author's opinion, the damage, though caused by the fire, releases the insurer from the indemnification of the damage caused by the explosion according to the principle of the limitation of the risk and such exemption is also in accord with the intention of both parties concerning the special clause in the Japanese fire policy, which states that the insurer is not responsible for the indemnification of the damage caused by the explosion. Although the theory is not the same as that of Drs. Nozu and Takeda, the author thus came to the same conclusion as theirs.



### 3. *Theory of causal relations in marine insurance*

Thus far, we have been concerned with the insurances against a single risk such as the fire insurance. Therefore, it is not yet clear whether or not the same holds with respect to the insurances against general or universal risk, such as marine and transportation insurances. The author believes however that quite a different theory should be set up in order to successfully deal with such insurances. In other words, there is no room, in author's opinion, for the use of the theory of adequate causal relations. Summing up the reason for it, the domain or background of the theory of causal relations is quite different in the case of the insurances, we shall be concerned with in this section. In other words, in the case of fire insurance, the validity of the theory is looked for with respect to the relation between the fire and other accompanying risks, while in the case of marine or transportation insurances, it is tested in the relation between various marine or inland risks themselves. As the risk which constitutes the object of marine insurances come under the category of a universal risk, we have no principle, by which we could select a risk as responsible for the damage. For instance, if a ship is lost in consequence of a collision with an other ship by the extinguishment of a lighthouse due to a war, we have no method to determine which was really the cause of the loss, collision or extinguishment of a light house (a war risk). If all of these risks are insured against, it is of course not necessary to select one as the cause of the damage from other risks or to make an ordering among these risks. But if some of the risks are exempted from the responsibility of the insurer, it is necessary for us to determine, whether the insurer is responsible for the indemnification or not. Therefore, we can not employ the theory of adequate causal relations, which ascribes the cause of the damage to the all sea risks standing in adequate causal relations to the damage.

In this country as well as in Europe, there are some students, who advocate the theory of adequate causal relations in such cases, although their respective paractical procedures are not the same. Therefore, we shall in what follows introduce various opinions related to this problem with a view to reviewing their respective validity.

(a) The theory which ascribes the cause to the risk insured against.

This theory was proposed by Dr. Imamura, according to whom the risk not insured against is a neutral fact. Therefore, we need not take it up, although it might also constitute a cause. The insurer is thus responsible for the indemnification of the damage, even if the risk not insured against is involved in causing the damage.<sup>17</sup> The author wishes to point

<sup>17</sup> Imamura, *The theory of Damages at Sea*, (in Japanese) p. 11. Dr. Omori also seems to be of the same opinion. *Practical Course of Damage Insurances*, (in Japanese) p. 134.

out in this connection that a more thorough-going inquiry should be made into his interpretation of the risk not insured against as a neutral fact. As has been already mentioned, a neutral fact does exist only in case there are main and secondary risks as in the case of fire insurance. On the contrary, there is no reason to look for such a fact, if no such distinction is made of competing risks.<sup>18</sup> In fact, a consequence not expected by both parties would take place, if we should dare to employ such a hypothesis. For instance, even if the exemption of the indemnification of the damage originating from the risk of war is explicitly provided for in the contract, the insurer is always responsible for the indemnification except in case the risk of war is solely responsible for the damage. And such a consequence is by no means accepted as usual in the dealing of marine insurance. (Refer to the "Ikaria" case.)<sup>19</sup>

(b) The theory, which ascribes the damage to the risk not insured against.

This theory was proposed by Ripert in connection with war risks.<sup>20</sup> It is certain that the risk not insured against is not the sole cause of the damage, just like the risk insured against is not its sole cause, when we adopt the theory of adequate causal relations. It is said that such a conclusion is also obtained from the standpoint of the limitation of risks. As has been pointed out repeatedly, such a stand is tenable in case of the insurance against a single risk, but not in case of the insurance against universal risk.

(c) The theory of quasi double insurance.

This theory was proposed by Bruck.<sup>21</sup> According to him, the damage caused by the risk not insured against should be indemnified by the insured himself. According to self-insurances or double insurances, the insurer is also requested to indemnify one half of the damage. However, there is no relation whatsoever between the quasi double insurance and the problem of causal relations and the proposed solution is nothing but the last one forcibly

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<sup>18</sup> If the risk not insured against should be characterized in some way, it is not the neutrality of the risk, but its limitation. Therefore, the insurer is always exempted from the indemnification (See related paragraphs in the foregoing). However, such a thing holds goods only in the case of the insurances against a single risk, such as fire insurance, and not in the case of the insurances against universal risks, which is the subject of this section.

<sup>19</sup> The "Ikaria" case was a dispute between the Leyland Shipping Co. and Norwich Union Fire Insurance Soc., which took place in 1918. At the time of the World War I, a ship called "Ikaria" was torpedoed by a German submarine off the coast of Havre and heavily damaged. For repairing, she was taken in tow to the port of Havre, but sank at the outer port due to a rough weather. The House of Lords handed down its decision ascribing the damage not to the sinking (the risk insured against), but to the torpedo attack by the submarine (the risk not insured against). (Cf. Templeman (Greenacre), *Marine Insurance*, 1934, pp. 139-135) Dr. Imamura is also in agreement with this decision.

<sup>20</sup> Ripert, *Droit Maritime*, Tome 3, 1953, n. 2680.

<sup>21</sup> Bruck, *Das Privatversicherungsrecht*, 1930, S. 405.



found as a result of the adoption of the theory of adequate causal relations.<sup>22</sup>

(d) The theory of undecidability.

This theory was proposed by Kisch. According to this theory, the insured is always at a loss, because we have no method to decide the cause of the damage from the standpoint of the theory of causal relations.<sup>23</sup> It is quite natural that such a conclusion is obtained as far as we adopt the theory of adequate causal relations with respect to marine insurance. The theory is therefore the most consistent and reasonable among all the proposed solutions, which have been mentioned in the foregoing. However, it is another problem, whether such a solution is well in accordance with the actual state of affairs in insurance businesses and to the ideas prevalent there. In fact, the proposed solution seems to be against the actual state affairs in insurance businesses.

As has been clear from various solutions for the theory of adequate causal relations as above enumerated, the theory gives rise to all the formally possible solutions with respect to marine and transportation insurances. In fact, it is almost impossible to select the most reasonable one out of such a large number of solutions thus proposed. In this connection, we recall with sympathy a statement of Hagen that the adoption of the theory of adequate causal relations opens the door to all possible kinds of disputes.<sup>24</sup> Like this, there is no possibility for us to obtain any satisfactory solution as far as we adhere to the theory of adequate causal relations. We are therefore obliged to adopt some individualizing theory of causal relations in place of the theories, which ascribe the damage to many risks. Among such theories, most important are the theory of effective cause, and that of *causa proxima* as well as the principle of natural consequences, of which, the first one will not be considered in detail, because it has been rejected by the majority as unreasonable. In fact, the theory of effective cause ascribes the damage to the so-called effective cause, which is quite subjectively determined being the product of perceptions. The theory is therefore without any theoretical ground. We shall accordingly take up the principle of *causa proxima* and that of natural consequences.

(a) The principle of *causa proxima*.

This principle is well-known and in use in the Marine Insurance Law in England. (Cf. M.I.A. § 55 (1)) Originally, it was the principle, which ascribed the damage to the condition, which took place last in the time series. It is therefore somewhat like the theory of *causa ultima*. However, the application of the principle has subsequently been extended and the condition, which does not necessarily come last temporarily, has sometimes

<sup>22</sup> Ritter, *Das Recht der Seeversicherung*, Bd. I, 1922, S. 471.

<sup>23</sup> This theory has already been introduced in connection with the causal relations in fire insurance. Refer to the paragraph which deals with it.

<sup>24</sup> Hagen, *Seeversicherungsrecht*, 1938, S. 58.

been designated as the *causa proxima* in its wider sense.<sup>25</sup> Such a tendency has further been developed after the World War I. However, the tendency was in most cases motivated not by any theoretical observation but by practical needs to remedy the unreasonable consequence, which occurs as a result of this principle. We have therefore no definite method in determining the *causa proxima* thus reinterpreted and we are in confusion as a result.<sup>26</sup> In order to get out of such difficulties, some students have proposed the introduction of the effective, or dominant, or real, or operative cause with a view to more successfully explain the selection of a cause in the temporal order.<sup>27</sup> The proposed solution by way of the introduction of such causes is however not beyond our common sense coming nearer to the afore-mentioned theory of effective cause. Nevertheless, some precedents in England are originating from a objective standard about the dominance of the cause to be selected and we can not deny that such a standard has motivated the rise of the theory of natural consequences, with which we shall be concerned in the following.

(b) The principle of natural consequences.

According to this principle, the cause of the damage should in principle be the first one out of many others, which took place in succession finally causing the damage. However, if the cause of the damage can by necessity be traced back to another one in the *chaîne* of the causes, the cause in question is supposed to constitute the sole cause of the said damage. In case the said cause is a risk insured against, the insurer is responsible for the indemnification. On the other hand, if the risk is not insured against, the insurer is not responsible for the indemnification. In reality, such a tracing back can not be made so far to all the events, which supposedly constitute the cause of the damage. On the other hand, the recognition of such causal relation between the damage and an event in the series of happenings is to be made in reference to all the objective conditions known at the time and from our everyday experiences.<sup>28</sup> Like this, the series of events which might be responsible for the damage, is reconstructed with all the objective conditions at the background. Therefore, the most immediate cause may sometimes be taken as the cause, while the remotest cause may sometimes be selected as the cause, even if these causes are connected to each other being seemingly all responsible for the damage. For instance,

<sup>25</sup> A certain amount of cigarettes insured are shipped together with leather. As a result of a storm, sea water comes in the ship spoiling the leather. The smell thus generated in turn spoils the cigarettes. In this case, an English court in charge of this case handed down its decision to the effect that the damage was proximately caused by perils of the seas. (*Montoya v. Lonson Assurance*, 1851.)

<sup>26</sup> Kato, *The Theory of Perils in Marine Insurance*, (in Japanese) 1932, p. 136.

<sup>27</sup> Templeman, loc. cit., p. 138.

<sup>28</sup> If the case is of special nature (for instance a happening during a voyage), experts (shipping operators) should be consulted.



suppose a ship came into a collision with an other ship and was damaged as a result of her blackout navigation. According to this principle, the collision should be the cause, if it happened at high sea, while the blackout navigation should be the cause, if the collision happened in the port or in a narrow strait. In other words, this principle is a more reasonable adaptation of the principle of the immediate cause. In fact, Ritter, expounder of this principle, calls it a version of the principle of the *causa proxima*.<sup>29</sup> As has already been mentioned in the foregoing, various interpretations of the principle of the immediate cause is also under the influence of this spirit, which is perhaps most in accordance with the real states of affairs in marine insurance businesses. In author's opinion, the principle should therefore be employed as the doctrine to determine the causal relations in Japanese general hull or cargo clauses.<sup>30 31</sup>

#### IV. *Difference between the theory of adequate causal relations and the principle of natural consequences.*

Thus far, we have been concerned with various principles of causal relations to be adopted in marine insurance. As has already been mentioned at the beginning of this paper, the principle of natural consequences is frequently confused with the theory of adequate causal relations and the former is sometimes supposed to a special case of the latter. We shall therefore be concerned in what follows with the clarification of the difference between these two principles. In the first place, we should recall that the inadequacy of the theory of adequate causal relations was emphasized by Ritter, when he expounded this theory. It is therefore clear that Ritter did not identify the theory with the theory of adequate causal relations. It should be pointed out that the method of generalization is in employment by both theories in observing the causal relations. However, the standard of determining the causal relation is quite different from each other. In the first place, according to the theory of adequate causal relations, any condition, which might possibly be the cause from general observations, are all considered to be the cause, while the natural course of events is the condition to be taken into consideration in determining the cause, if we adopt the theory of natural consequences. In the former theory, the relation between the damage and cause is not so strictly in determination as in the latter theory. In other words, the latter does not demand us to look for the cause so far, as the former does. As has been briefly pointed out in the foregoing such a difference takes place as a result of the difference of

<sup>29</sup> Ritter, loc. cit., S. 474.

<sup>30</sup> With this respect, further refer to Kato, *The Theory of Perils in Marine Insurance*, (in Japanese) p. 139.

<sup>31</sup> Hagen (loc. cit., S. 58) is also in agreement with this principle. For the above-mentioned reason, Gierke (*Versicherungsrecht*, II, 1947, S. 269) further adopts the principle in marine insurance.

their respective standard of determining the cause of the damage. In finding out a condition, which is standing in adequate causal relations to the damage, we have to make a large number of observations both in the case of the existence and non-existence of the condition in question. If the damage takes place more frequently in the case of existence, than in the case of non-existence, the condition is supposed to be the cause of the damage from the standpoint of the theory of adequate causal relations. In the opposite case, the condition can not be the cause of the damage. In other words, the theory of adequate causal relations is interested not only in the case of the existence of the condition, but also in its non-existence in order to compare the frequency of these two cases. On the other hand, the theory of natural consequences is only interested in the frequency of the occurrence of the damage in event the condition in question takes place. In general, we recognize the existence of a causal relation, if the frequency is more than 70%. From our everyday experience, we say that the occurrence is necessary or contingent or rare in accordance with the frequency of 100%, about 50% or under 20~30%. In most cases, we do not grasp the situation statistically, but can well understand it.<sup>32</sup> For example, let the probability that a ship collide and is damaged at high sea in her blackout navigation be  $1/100$ . Further, let the similar probability in port be  $70/100$ . According to the theory of natural consequences, the blackout navigation can be made the cause of the damage only in the latter case. However, if we adopt the theory of adequate causal relations, we have to obtain statistical material not only about the blackout navigation, but also about the lighting navigation as well. Suppose the probability about the lighting navigation be  $1/1000$  and  $5/1000$  respectively at high sea and in port. As they are both smaller than the respective probability in the case of the blackout navigation, the blackout navigation can be the cause of the damage as a condition, which is generally favourable or helping to the occurrence of the said damage. As is clear from the foregoing, the theory of adequate causal relations ascribes the damage to an event, even if the probability of its occurrence with and without the event are respectively only  $2/100$  and  $1/100$ . On the other hand, the event in question could not be the cause, if the former was  $80/100$  and the latter  $85/100$ .<sup>33</sup> According to the theory of natural consequences an event can always be the cause of the damage, if the probability of its occurrence with the said event is larger than  $70/100$ . Of course, we do not have any particular intention in using these figures other than to numerically represent the notion of natural con-

<sup>32</sup> In determining the probability, surveyers should be consulted about special problems. This has already been mentioned in dealing with the theory of natural consequences.

<sup>33</sup> Suppose a patient died from cancer after undergoing an operation. Statistically, the death rate is larger in the case without operation than with operation. According to this theory, the operation is not the cause of the death.



sequences. Like this, there is an essential difference between the theory of adequate causal relations and that of natural consequences. It is therefore utterly erroneous to identify them or to deal their difference merely as a matter of degree.

# CHANGES OF INCOME DISTRIBUTION IN JAPAN

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## I. *The Inequality Measure*

It is necessary first to have a definite idea of the apparatus that we use to measure changes in the distribution of income by size. We set up a hypothesis that income distribution is of the Gibrat type, i.e. logarithmic-normal, and we shall then observe how the Gibrat phenomenon is found in the personal income and profits distribution in Japan.

The study of size distribution of income has been advanced by the great achievement of R. Gibrat.<sup>1</sup> His assumption that the effect of each of numerous factors is not independent but proportional to the effect of others (*la loi de l'effet proportionnel*) is quite adequate as a relation of economic variates. If any distribution is log-normal, two characteristic parameters of distribution, i.e. mean ( $m$ ) and standard deviation ( $s$ ) in terms of logarithms, computed from empirical data, have definite statistical meanings, and using only the above two estimates we can exactly describe the structure of distribution. We employ in this study the Gibrat inequality index (his notation  $C$ ), because a satisfactory measure of inequality should be derived from such a theoretical assumption on the model of distribution as Gibrat index, and we shall inquire into the secular and cyclical movements of inequality of income and profits.

We consider, however, that a satisfactory inequality measure, from a view point of economic welfare, must be constructed not only by dispersion (standard deviation), but also by average level (mean). The economic welfare is increased through an increase in total amount of (or per capita) income, but distribution is better when dispersion is smaller, so a more adequate measure should be the coefficient of variation (i.e. dispersion referred to mean.) Since there is an invariant relationship between the Gibrat index ( $100/a$ , where  $a$  is the coefficient of his equation) and the coefficient of variation,<sup>2</sup> we shall also use the coefficient of variation and inquire

<sup>1</sup> R. Gibrat, *Les Inégalités Économiques*, Paris, 1931. M. Kalecki, On the Gibrat Distribution, *Econometrica*, vol. 13, 1946, pp. 161-170. Gibrat's law of proportional effect is qualified and obtaining a more fruitful development in the direction of treating it as a stochastic process.

<sup>2</sup> The apparatus employed is of the equation  $y=1/\sqrt{2\pi} \exp. \{-z^2\}$  with  $z=a \log (x-x_0)+b$ , where  $y$  is the number of income recipients,  $x$  is the size of income,  $x_0$  is modifying factor



into the changes of standard deviation and the movements of mean separately. The study of size distribution has been concentrated to a single inequality measure, but it is of more interest to investigate the relation between the changes of dispersion and fluctuations of average level. Through the following analysis, we note that during booms (or inflationary periods) the average level and inequality moves upward, while during depressions (or deflationary periods) the both estimates diminish. But sometimes we find counter movements of mean and standard deviation. These periods, roughly speaking, are transitive or turning points in trade cycles.

## II. *Personal Income Distribution*

We must briefly describe the data employed in this analysis. Materials on the income distribution by size are not abundant, and there are no adequate annual estimates in Japan, except the information on incomes from tax returns (the Bureau of Internal Revenue). Converting the aggregate income reported to per a family basis by dividing by the number of individuals excluding their dependants, we shall use as a mean (average level). The data from 1887 to 1898 included not only personal income but also corporation income and interest, while after the World War II only a sample study of the self-assessed income reported is available, so that we shall focus our attention on the period from 1899 to 1944.

Let us look at the Fig. I (1-6). These examples are the percentage cumulative distributions plotted on probability papers (used original units, without subtracting  $x_0$ ). We find that the Gibrat phenomenon (linearity of lines) appears more clearly if we use the modifying factor  $x_0$ , and the hypothesis advanced above is confirmed. During such a long period the Gibrat shape of income distribution has been maintained in Japan. Table I is the annual inequality index ( $100/a$ ) computed from the equation  $z = a \log_{10} (x - x_0) + b$ ,

those introduction shifts the origin of the  $x$  values. Gibrat's "indici inégalité" is  $100/a$ , that is equivalent to the standard deviation ( $s$ ) in terms of logarithms of  $(x - x_0)$ .

$$a = 1/\sqrt{2} \cdot s$$

$$Vx = \sigma/\mu$$

In a logarithmic-normal distribution,  $Q = \log X$ , let be the mean of  $X$  by  $\mu$ , the mean of  $Q$  by  $m$ , the standard deviation of  $X$  by  $\sigma$ , the standard deviation of  $Q$  by  $s$ , the coefficient of variation of  $X$  by  $Vx$ ,

$$s^2 = \log (V^2x + 1)$$

(R. A. Fisher, *An Elementary Treatise on Frequency Curves*, 1922)

The Gibrat inequality index ( $100/a$ ) has therefore a definite relation to the coefficient of variation of  $X$  ( $\sigma/\mu$ ).

On the other hand,  $b$  in the equation  $z = a \log (x - x_0) + b$ , is equivalent to the reciprocal of the coefficient of variation of  $Q$  (i.e. in terms of logarithms of  $X$ ), because

$$b = -\frac{m}{\sqrt{2} \cdot s}$$

Fig. I

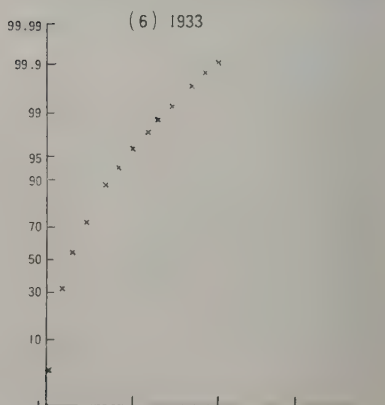
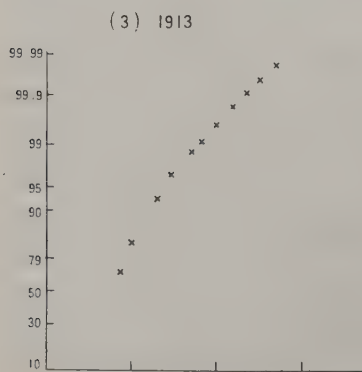
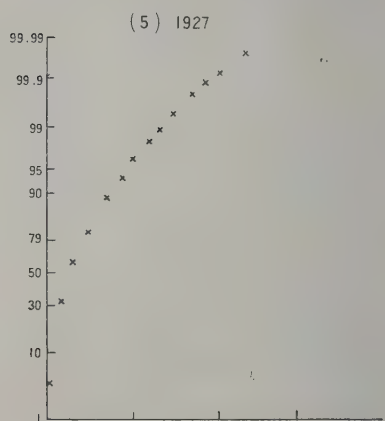
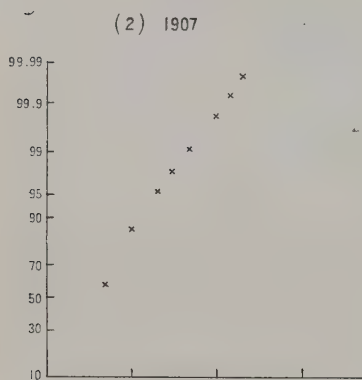
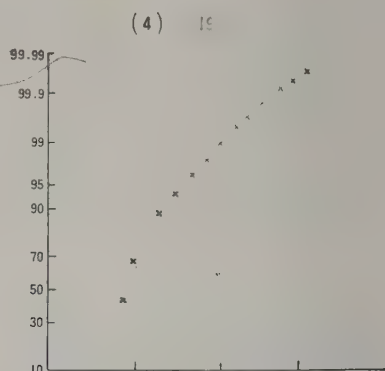
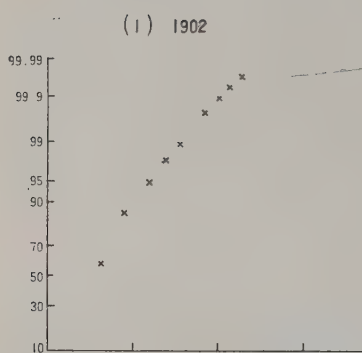




Table I *Inequality Index of Personal Income*

$$z = a \log_{10}(x - x_0) + b$$

Years	x	a	100/a	b
1912	0.3	1.2412	80.57	1.8304
1913	0.5	1.4107	70.89	1.2286
1914	0.5	1.4451	69.20	1.2048
1915	0.5	1.4055	71.15	1.2388
1916	0.5	1.3761	72.67	1.2363
1917	0.5	1.2570	79.56	1.1807
1918	0.7	1.1926	83.85	1.1151
1919	0.7	1.2346	81.00	1.0639
1920	0.8	1.6301	61.35	0.6547
1921	0.8	1.3488	74.14	0.6717
1922	0.8	1.4270	70.08	0.6118
1923	0.8	1.3587	73.60	0.6402
1924	0.8	1.3898	71.95	0.6227
1925	0.8	1.3854	72.18	0.6126
1926	1.2	1.3356	74.87	0.4499
1927	1.2	1.2563	79.60	0.4686
1928	1.2	1.2665	78.96	0.4454
1929	1.2	1.3592	73.57	0.3668
1930	1.2	1.2685	78.84	0.4415
1931	1.2	1.2717	78.64	0.4650
1932	1.2	1.3664	73.18	0.4195
1933	1.2	1.3620	73.42	0.4092
1934	1.2	1.2558	79.63	0.4665
1935	1.2	1.2658	79.00	0.4441
1936	1.2	1.2726	78.58	0.4231
1937	1.2	1.2636	79.14	0.3902
1938	1.0	1.2819	78.01	0.4377
1939	1.0	1.3644	73.29	0.3457
1940	8.0	1.2797	78.15	-0.2309
1941	8.0	1.3549	73.81	-0.3138
1942	5.0	1.3709	72.95	-0.0329
1943	5.0	1.3252	75.46	0.0953
1944	5.0	1.3147	76.06	0.1926

and Table II is the coefficient of variation ( $\sigma/\mu$ ) calculated from the number of recipients and the amount of assessed income.

Table II *Coefficient of Variation of Personal Income*

Years	$\mu$ (Yen)		$\sigma$ (Yen)		$\sigma/\mu$
1899	595.6	100.0	1,011.7	100.0	1.6986
1900	587.1	98.6	1,148.0	113.5	1.9553
1901	570.2	95.7	1,070.3	105.8	1.8770
1902	561.6	94.3	934.4	92.4	1.6638

Years	$\mu$ (Yen)		$\sigma$ (Yen)		$\sigma/\mu$
1903	722.4	121.3	1,483.5	146.6	2.053
1904	727.9	122.2	1,523.8	150.6	2.0934
1905	731.2	122.8	1,571.7	155.4	2.1494
1906	730.3	122.6	1,543.7	152.6	2.1137
1907	739.6	124.2	1,467.7	145.1	1.9844
1908	744.3	125.0	1,489.9	147.3	2.0017
1909	741.3	124.5	1,427.4	141.1	1.9255
1910	736.6	123.7	1,381.1	136.5	1.8749
1911	734.2	123.3	1,353.8	133.8	1.8439
1912	755.2	126.8	1,433.6	141.7	1.8983
1913	894.8	150.2	1,599.1	154.1	1.7424
1914	911.3	153.0	1,813.1	179.2	1.9895
1915	885.0	148.6	1,783.9	176.3	2.0157
1916	899.8	151.1	2,180.6	215.5	2.4234
1917	1,011.5	169.8	3,700.0	365.7	3.6579
1918	1,306.1	219.3	5,016.3	495.8	3.8406
1919	1,361.7	228.6	4,426.1	437.5	3.2504
1920	1,883.6	316.3	4,782.8	472.7	2.5391
1921	2,154.1	361.7	5,768.0	570.1	2.6776
1922	2,204.1	370.1	6,120.9	605.0	2.7770
1923	2,228.3	374.1	6,603.5	652.7	2.9634
1924	2,182.3	366.4	5,956.7	588.8	2.7295
1925	2,199.8	369.3	7,060.6	697.9	3.2096
1926	3,159.5	530.5	9,125.3	902.0	2.8882
1927	3,285.4	551.6	10,720.5	1,059.7	3.2630
1928	3,329.3	559.0	9,609.5	949.8	2.8863
1929	3,376.8	567.0	10,447.9	1,032.7	3.0940
1930	3,343.4	561.4	10,545.8	1,042.4	3.1542
1931	3,238.8	543.8	9,544.0	942.4	2.9436
1932	3,130.1	525.5	8,088.4	799.5	2.5840
1933	3,208.0	538.6	8,553.1	845.4	2.6661
1934	3,294.6	553.2	11,110.2	1,098.2	3.3722
1935	3,331.3	559.3	9,937.7	982.3	2.9831
1936	3,393.8	569.8	11,195.1	1,106.6	3.2986
1937	3,585.3	602.0	14,869.1	1,469.7	4.1472
1938	3,113.8	522.8	15,754.1	1,557.2	5.0594
1939	3,249.2	545.5	14,072.3	1,391.0	4.3310
	(1,000 yen)		(1,000 yen)		
1940	14,442.	2,424.8	36,523.	3,610.1	2.5289
1941	13,881.	2,330.6	33,357.	3,297.1	2.4030
1942	8,477.	1,423.3	19,600.	1,937.3	2.3121
1943	8,039.	1,349.7	18,169.	1,795.9	2.2601
1944	7,355.	1,334.9	16,111.	1,592.5	2.1904

These two estimates may be analyzed in various ways, but we should like to concentrate our attention on the two aspects—secular and cyclical changes of income inequality. Is there a tendency for incomes to become more or less equally distributed as time goes on? And during a general prosperity accompanied by changes in the relative income shares (or in the



proportions of different income sources), in what direction does the income inequality fluctuates? According to the inequality index, income distribution in Japan became more or less equalized after the World War I, but in respect of the coefficient of variation we recognize the general tendency towards greater inequality until the Great War II. (This tendency is shown also from Pareto's coefficient).<sup>3</sup>

The observations of inequality indices indicate that inequality fluctuates regularly with an upward shift during war time booms and with a downward shift in the postwar depression periods. Gibrat index (equivalent to standard deviation in terms of logarithms) shows that increase (decrease) of inequality means that the range between upper and lower classes increases (decreases). However, when this index is applied to income tax statistics, the lower class of assessed income is restricted by its relatively unchanged tax exemption limit, the increase (decrease) of dispersion indicates that the changes which occurred only in the upper groups.

In studying the change of frequency distribution, it is of particular interest, as above mentioned, to investigate the relative movements of level and dispersion. Now we shall observe the coefficient of variation (in absolute

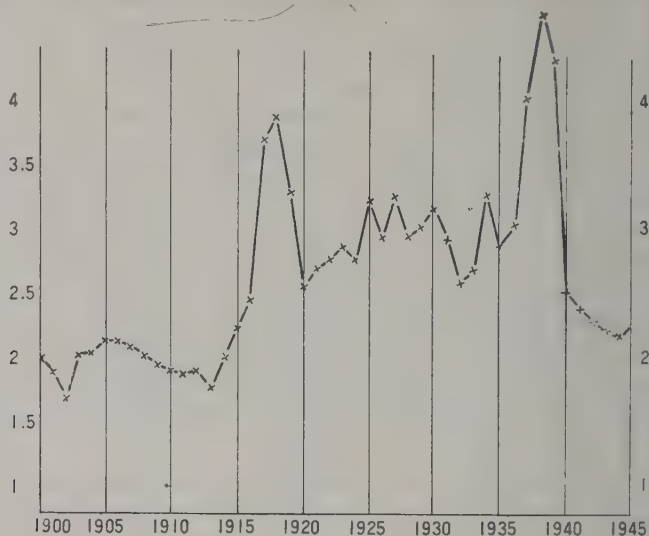
Pareto's Coefficient

1903	1.92	1924	1.76
4	1.87	25	1.71
5	1.84	26	1.72
6	1.86	27	1.68
7	1.87	28	1.67
8	1.86	29	1.66
9	1.87	30	1.66
10	1.92	31	1.70
11	1.94	32	1.59
12	1.91	33	1.60
13	1.90	34	1.65
14	1.89	35	1.68
15	1.89	36	1.66
16	1.78	37	1.65
17	1.58	38	1.55
18	1.55	39	1.59
19	1.61	40	1.62
20	1.85	41	1.68
21	1.74	42	1.70
22	1.75	43	1.72
23	1.72	44	1.76

Computed by Prof. S. Shiomi.

numbers, being equivalent to Gibrat's  $a$ , as pointed out in note 2), and investigate in detail each fluctuations of mean and standard deviation separately.

Fig. II  
Coefficients of Variation (Personal Income in Japan)



Annual levels of income since 1899 have gradually increased and the movements were nearly corresponding to the change of prices. The years of decline were the periods 1902, 1910—1911, 1915, 1924, 1930—1932, and 1938. The inspection of Table II and Fig. II shows that in general mean and standard deviation moves in same direction, i.e., higher income level and more severe inequality during booms, and lower level and diminished inequality during depressions. However, the rate of changes in two estimates is different. For example, in 1918 (a boom during the Great War I) standard deviation increased more than the change of level, so that the coefficient of variation of this year is the highest, and in 1932 (a year of depression) standard deviation rapidly decreased with the lowest value of the coefficient. But sometimes the reverse phenomenon occurred—mean and deviation moved in opposite direction. Such a phenomenon happened in 1900, 1907 (after 1905–6 war), 1919 (after the Great War), 1928, 1930 (beginning of great depression) and we perceive this phenomenon also in the years 1935, 1938, and 1939 (war years prior to the Great War II). The opposite movements of income level and inequality indicate that these years were corresponded to the turning point of business cycles. We suppose that these reverse movements of level and dispersion may account for some aspects of interrelation of business cycles and economic growth.



III. *Profits Distribution*

Business cycle theory stimulated the idea that the proportions of property income (especially entrepreneurial income) in the total tend relatively to increase with prosperity, and to decrease with depression. But is the inequality of enterprisers' income associated with movements of their relative shares? In general, the relation between inequality and relative share has not been so far investigated. We shall approach to this problem, comparing the inequality of personal income and profits distributions.

Table III *Inequality Index of Profits*

Years	a	100/a	$x_0$	b
1930	1.3631	73.35	0.8	1.2264
1931	1.4219	70.32	0.6	1.1882
1932	1.4571	68.62	0.6	1.2456
1933	1.3628	73.37	0.6	1.1928
1934	1.3391	74.67	0.6	1.1405
1935	1.4154	70.64	0.6	0.9719
1936	1.3800	72.46	0.6	1.0593
1937	1.4097	70.93	0.6	0.8699
1938	1.4016	71.34	0.6	0.7853
1939	1.3380	74.73	0.6	0.7837
1940	1.3506	74.04	0.6	0.6411
1941	1.4238	70.23	0.6	0.5547

Table IV *Coefficient of Variation of Profits*

Years	$\mu$	Yen	$\sigma$	Yen	$\sigma/\mu$
1930	1,192.1	100.0	2,146.6	100.0	1.800
1931	1,081.7	90.7	2,457.7	114.5	2.272
1932	1,025.5	85.0	1,807.9	84.2	1.762
1933	1,097.7	92.1	2,487.9	115.9	2.266
1934	1,163.6	97.6	2,703.0	125.9	2.322
1935	1,207.3	101.3	2,590.7	120.7	2.145
1936	1,239.5	104.0	2,613.5	121.8	2.108
1937	1,313.8	110.2	2,798.2	130.4	2.129
1938	1,453.6	121.9	3,715.8	173.1	2.556
1939	1,738.3	145.8	5,554.9	258.8	3.195
1940	2,021.5	169.6	5,813.5	270.8	2.875
1941	2,138.5	179.4	5,349.1	249.2	2.501

The business profits tax statistics by size are available only with respect to the un-incorporated enterprises between 1930 and 1941. Table III gives the inequality index and Table IV indicates the coefficient of variation.

Comparing the coefficients of variation on income and profits (see

Fig. III Coefficients of Variation

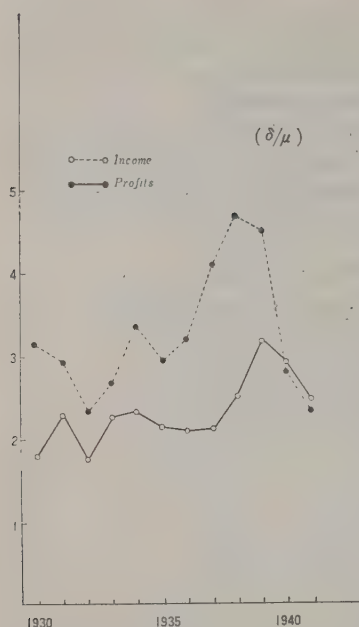


Fig. III), we notice that their movements are nearly in correspondence. Usually it is assumed that profits and losses are accentuated by boom and depression, while personal income (especially labor income) are in turn subject to a change in opposite direction. This assumption seems to be contradicted by our results. Yet, the contradiction is only apparent, because the composition of personal income reported on returns must be analysed to find out the components which are sensitive to economic fluctuations. In short, that is the question about relation between income by size and by sources. When we use the Statistics of Income, the assessed income is the upper class of incomes in total national income, if the tax exemption limit is relatively high. This means that the location of the dividing point splitting total income into two sections is very high, and we have to treat only the upper income groups.

The assessed income includes various categories of receipts. Property income, especially corporate dividends and profits is received largely by those whose average income is relatively high, and a change in the proportion of income going out as dividends and profits would be associated with the share of upper income groups.<sup>4</sup> For example, the composition of personal income is as follows: (percentage based on tax returns reported by the patterns of incomes.)

Almost all components of assessed personal income in Japan were property income fluctuating with trade cycles. Lack of data on corporate profits distribution prevents us from drawing a definite conclusion, but the fact above indicated seems to be the reason why the coefficients of variation of income and profits show more or less proportional movements. But, with respect to cyclical flexibility, entrepreneurial income and dividends changed more violently.

If property income fluctuates cyclically more than labor income, and the upper income groups hold larger share in property income, the observed changes in inequality of personal income will be explained. During prosperity the inequality will increase because of the larger proportional rise of

<sup>4</sup> Simon Kuznets, *Shares of Upper Income Groups in Income and Savings*, (NBER), 1953.

*Percentage Shares in Personal Assessed Income in Japan*

	Rent	Entrep. income	Interest	Dividends	Employee comp.
1930	25.50	32.05	2.47	12.40	27.58
1931	23.42	31.60	2.74	11.87	30.37
1932	24.53	31.63	2.94	10.94	29.96
1933	25.10	32.57	2.78	10.32	29.24
1934	23.97	33.47	2.40	11.12	29.04
1935	23.05	33.94	2.09	11.23	29.69
1936	23.62	33.25	1.85	11.70	29.59
1937	22.15	32.07	1.59	15.59	28.60
1938	21.69	31.58	1.36	14.45	31.00
1939	19.59	34.59	1.16	13.73	30.94

the upper income groups, and during depression it will decrease. However this verification is confined to the upper income class. If we have other data including the lowest income groups, we may observe the rise of inequality during depression, as Mr. Horst Mendershausen pointed out.<sup>5</sup>

The factors determining size distribution of income and profits are numerous, and they are not independent of general economic and social framework.<sup>6</sup> The economic factors are subject to long run changes and to cyclical influences, and we can not isolate the determinants of different effects distinctly. We have been attempting to analyze the determinants by dividing the aggregates into components directing attention on the importance of the relation of income components and cyclical changes. If we were able to observe some of the special components in personal income, i.e. entrepreneur's earnings and dividends as well as their inequalities, we could recognize a more distinct relationship between personal income and business cycles.

A brief presentation will be made of the effects of the income inequality upon the consumption function. It is assumed that collective consumption function depends on the distribution of income, and effect of changes in the income distribution may modify the propensity to consume without affecting the individual coefficients. If consumption depends on income, and if personal marginal propensity to consume is the smaller the larger the income, then income equalization raises consumption,<sup>7</sup> and there will be a negative correlation between income inequality and consumption. We have no data concerning to the distribution of consumption from disposable income.

<sup>5</sup> Horst Mendershausen, Changes in Income Distribution during the Great Depression, *Studies in Income and Wealth*, Vol. 7, 1946.

<sup>6</sup> George Garvy, Inequality of Income; Causes and Measurement, *Studies in Income and Wealth*, Vol. 15, 1952.

<sup>7</sup> Jacob Marschak, *Income, Employment and the Price Level*, 1951.



Fig. (1) Coefficient of Variation  
and Consumption ratio  
(1912 (1)~1925 (14))

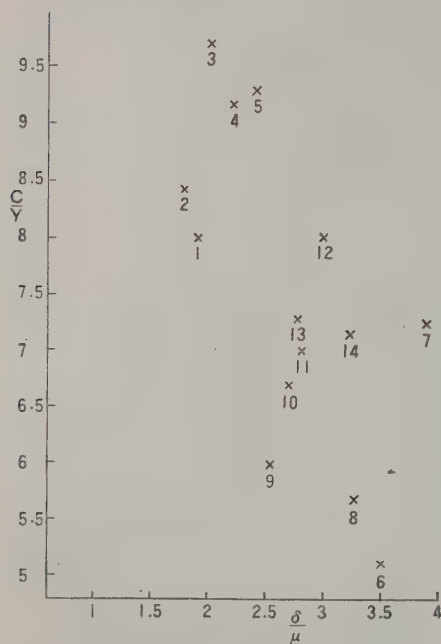


Fig. IV (2) (1926 (11)~1939 (4))

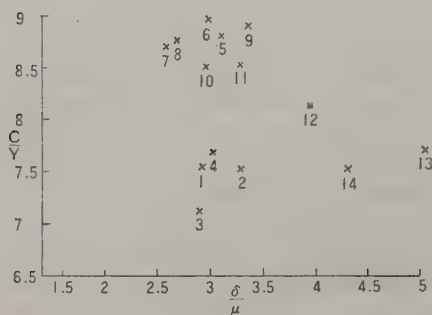


Fig. IV (1—2) presents a comparison of the coefficients of variation (from income tax data) and consumption ratio (from the national income estimates). The usual aggregate consumption function assumes that income distribution is given or the distribution does not have any effect upon consumption. However, since income distribution fluctuates even in a short period, such an assumption should be examined from empirical study of the variations of income inequality.

In summary, the study of size distribution has not paid sufficient regard to the dynamic aspects to which we have drawn attention. It is necessary to investigate into the relationship between average level and dispersion, i.e. two distribution parameters, and we have to take them up one by one, because standard deviation changes more rapidly than the average level in a dynamic process.

# EQUILIBRIUM IN INTERNATIONAL TRADE: A DIAGRAMMATIC ANALYSIS OF THE CASE OF INCREASING COST

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The diagrammatic analysis of the equilibrium condition of and the gain from international trade has been developed with reference to the case of increasing cost.<sup>1</sup> The case of increasing cost is most convenient to deal with, because a double maximum condition required for the maximisation of entrepreneurial surplus and satisfactions are explained by the equi-marginal principle.

It is the purpose of this paper to attempt a simple and exact diagrammatic representation of equilibrium and gain in international trade in the case of increasing cost. A rigorous mathematical model is provided in Appendix. It is not the purpose of this paper to add new findings to the analysis hitherto developed, but to present a fundamental chart, particularly a compound offer curve, for the analysis of transfer problem, optimum tariff, technological improvement, economic growth, and so forth.

Although the analysis is extended to a three country trade in the last part of this paper, we shall confine ourselves to the models in which two countries (say England and German as assumed by J. S. Mill) trade with respect to two commodities (say, E-goods and G-goods) which are produced with increasing costs. Each country is, however, assumed to be a single unit, as if it were an individual, or to be consisted of individuals who are exactly alike. Each country is further assumed to have the utility function or community preference scale of its own, although we do not have any intention

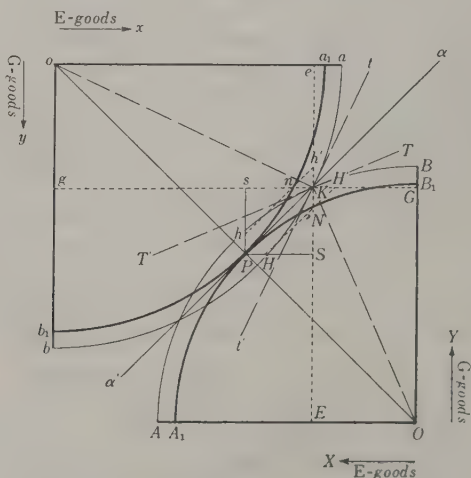
<sup>1</sup> Among the contributions to this subject, the following are important: Wassily W. Leontief, "The Use of Indifference Curves in the Analysis of Foreign Trade," *Quarterly Journal of Economics*, 1933, reprinted in *Readings in the Theory of International Trade*, ed. H. S. Ellis and Lloyd A. Metzler, 1949. Abba P. Lerner, "The Diagrammatical Representation of Cost Conditions in International Trade," *Economica*, Aug. 1932; "The Diagrammatical Representation of Demand Conditions in International Trade," *Economica*, Aug. 1934; both are reprinted in *Essays in Economic Analysis*, Macmillan, 1953. R. E. Baldwin, "Equilibrium in International Trade: A Diagrammatic Analysis," *Quarterly Journal of Economics*, Nov. 1948. Gottfried Haberler, "Some Problems in the Pure Theory of International Trade," *Economic Journal*, June 1950. J. E. Meade, *A Geometry of International Trade*, George Allen & Unwin, 1952. Charles F. Haywood and Theodore K. Ruprecht, "A Note on the Use of the Box Diagram in International Trade Theory," *American Economic Review*, June 1954.

to inquire into the way of constructing the community preference scale. All the models in this paper represent a static general equilibrium system, in which production function, utility function, and pre-trade quantity of production and consumption and prices are given at the outset. It is assumed that both countries behave to maximise the sum of their gains from trade and to keep the balance of trade in equilibrium. It is also assumed, as usually done, that transportation costs and trade barriers do not exist.

### I. Model I: *Pure Specialisation Exchange*

Let us suppose that two countries exchange between each other the increment of production, in which each country has a comparative advantage, so as to maximise their entrepreneurial surplus. The entrepreneurial surplus means the difference between the revenue from exports and cost needed to produce the exports, the revenue and cost being measured in terms of numéraire (E-goods). We have then a pure specialisation exchange model. It serves to explain the gain from the international division of labor carried along the line of comparative advantage, since it does not take into consideration changes in the consumption of both countries.

Fig. 1



In Fig. 1, the German production fan,  $oab$ , is superimposed upon the English production fan,  $OAB$ , so as to make each pre-trade equilibrium point coincide at  $K$ . Curves  $AB$ ,  $A_1B_1$ , etc. are transformation (or opportunity cost) curves for England, and  $ab$ ,  $a_1b_1$ , etc. are those for Germany. Each transformation curve shows constant returns to scale. Any combination of the two commodities on the curve is produced with a constant



amount of resources (or "bales" in Marshallian terminology). The transformation curve is concave to the origin because of the law of diminishing returns to varying proportions of production factors, or, because of the increasing cost for each commodity.<sup>2</sup> For the simplicity and exactness of charting, the transformation curves are supposed to be a concentric circle, the center of which is the origin,  $O$  for England and  $o$  for Germany.

The pre-trade equilibrium is seen at  $K$  for both countries. England produced  $OE$  of E-goods and  $OG$  of G-goods at a price ratio shown by the slope of  $TT'$  line, which is tangent to the transformation curve  $AB$ . Germany produced  $oe$  of E-goods and  $og$  of G-goods at a price ratio shown by the slope of  $tt'$  line, which is tangent to the transformation curve  $ab$ .

Connecting the origins of both countries, we have a line  $Oo$ , which may be called the *producer's contract curve*. The transformation curve of the two countries is always tangent to each other on  $Oo$  line, and, consequently, the equilibrium of trade falls on this line.

We may consider two cases for Model I.

*Model IA.* Let us suppose that the two countries minimise the resources required to obtain through trade the same combination of the two commodities as they had before the opening of trade.<sup>3</sup> Then, the trade gives rise to the economy of resources for both countries.

In Fig. 1, the above assumption takes the form that both countries are ready to obtain the combination of commodities at  $K$ . Let us draw a line  $aa'$ , the international price line, passing through  $K$  perpendicularly at  $P$  to  $Oo$  line.  $P$  is the new production point for both countries. Since the line  $aa'$  is tangent at  $P$  to the transformation curves of the two countries,  $A_1B_1$  for England and  $b_1a_1$  for Germany, the new production point  $P$  satisfies such a required equilibrium condition that the marginal rate of production substitution between the two commodities is equal in both countries to the international price ratio.

Because of the above assumption, the difference of quantity of the two commodities at  $P$  and at  $K$  is counterbalanced in the following way. England exports  $PS$  of E-goods in exchange for  $SK$  of G-goods, while Germany exports  $Ps (=SK)$  of G-goods in exchange for  $sK (=PS)$  of E-goods. The ratio of  $PS$  of E-goods to  $SK$  of G-goods is equal to the international price ratio, which is represented by the slope of the line  $aa'$ . The trade is therefore balanced.

The gain from the trade may be seen as the economy of resources for

<sup>2</sup> See, Paul A. Samuelson, *Foundations of Economic Analysis*, Cambridge, Harvard University Press, 1948, pp. 233-235.

<sup>3</sup> Harrod provides us with a formula which determines the equilibrium price ratio from ordinary cost-and-quantity supply schedules under simplified assumptions. One of his assumptions is that the total production of the participants as a whole remains the same. See R. F. Harrod, *International Economics*, 1939, pp. 22-35 and Appendix (pp. 201-203). Our Model IA is accord with his assumptions.



In Fig. 2, the English production fan,  $OAB$ , and German production fan,  $oab$ , as well as the initial equilibrium point for both countries,  $K$ , are the same as in Fig. 1. Let us move the German production fan from  $oab$  to  $o'a'b'$  until it touches the English production fan at  $P$ . As a result of this movement, the German origin  $o$  and its initial equilibrium point  $K$  move respectively to  $o'$  and  $k'$ . Let us connect the English origin,  $O$ , with the new German origin,  $o'$ . Then we have a new producer's contract curve  $Oo'$ .

Let us extend a vertical line through  $K$ , the English initial equilibrium point, and a horizontal line through  $k'$ , the German initial equilibrium point. Let their intersection be  $R$ . Let us further draw the international price line,  $aa'$  passing through  $R$  perpendicularly at  $P$  to the producer's contract curve,  $Oo'$ . Then, the equilibrium conditions of trade are explained in the same way as in Model IA.

At  $P$ , the new production point of the two countries, the marginal rate of production substitution between the two commodities is equal with respect to both countries to the international price ratio.  $PS$  of English E-goods is exchanged for  $SR$  of German G-goods, the ratio of them being equal to the international price ratio. The trade is therefore balanced.

The gain from the trade may be seen as the increase of importable commodities in both countries. For England, the combination of commodities at  $R$  as compared with that at  $K$  shows the same amount of exportable commodities ( $OE$  of E-goods) and a larger amount of importable commodities ( $ER$  of G-goods which is larger than  $EK$  by the amount of  $KR$ ). For Germany, the combination of commodities at  $R$  as compared with that at  $k'$  shows the same amount of exportable commodities ( $o'g'$  of G-goods) and a larger amount of importable commodities ( $g'R$  of E-goods which is larger than  $g'k'$  by the amount of  $k'R$ ).

The gain from trade may, however, be measured more exactly as the entrepreneurial surplus. Passing through  $K$ , let us draw a line  $HKH'$  in parallel to the international price line  $aa'$ . Then, as in Model IA, it is clear that the cost of  $PS$  of E-goods for England is  $SK$  of G-goods or  $HS$  of E-goods. Therefore, the entrepreneurial surplus for England is  $PS - HS = PH$  or  $RH'$  in terms of E-goods (numéraire). By reasoning in similar way, we find that the entrepreneurial surplus for Germany is  $k'R$  in terms of E-goods. The sum of the entrepreneurial surplus of these two countries is  $k'R + RH' = k'H'$  in terms of E-goods. If we measure the entrepreneurial surplus in terms of G-goods, it will be  $KR$  for England and  $Rh'$  for Germany, their sum being  $Kh'$ . It is clear that the sum of the entrepreneurial surplus of both countries in this case is the same as the sum of increments of importable commodities for both countries, which in turn is equal to vector  $oo'$ , or  $Kk'$ .

The resources are economised in Model IA, while the importable com-





exchange which is based upon consumption (or utility) indifference curves and initial stocks and which aims at the maximisation of satisfactions (or total utilities) of participants of exchange. We have set up in the previous section the pure specialisation exchange model which aims at the maximisation of entrepreneurial surplus of participants of exchange. The compound exchange model in this section aims at the double maximisation of entrepreneurial surplus and satisfactions of participants of exchange.

In Fig. 3, the German production fan,  $oab$ , and its utility surface are superimposed upon the English production fan,  $OAB$ , and its utility surface so as to make each pre-trade equilibrium point coincide at  $K$ . The rule of charting is the following:

(1) It is supposed as before that the production transformation curves for each country are concentric circles with the center at  $O$  for England and  $o$  for Germany. By connecting the center of both countries, the producer's contract curve  $Oo$ , may be drawn.

(2) It is supposed that consumption indifference curves for each country are concentric circles with the center (bliss-point) at  $C$  for England and  $c$  for Germany. By connecting the center of both countries, the consumer's contract curve  $Cc$ , may be drawn.

(3) The pre-trade equilibrium for each country requires such conditions that the marginal rate of consumption substitution equals the marginal rate of production substitution and both of them equal the pre-trade price ratio of the two commodities. This is seen for England at  $K$ , where English transformation curve,  $AB$ , is tangent to one of its consumption indifference curves,  $I$ , and the slope of the tangent is the pre-trade price ratio for England. Similar situation is seen at  $K$  for Germany, but it is not shown in Fig. 3 for avoiding the complexity of chart. German indifference curves,  $i$ ,  $ii$ , etc., correspond to its production fan,  $o'a'b'$ , which is moved from  $oab$ . Therefore, the initial equilibrium condition for Germany can clearly be seen at  $k'$ .

(4) The above condition required for the pre-trade or closed-system equilibrium is always satisfied with any point on line  $OC$  for England and on line  $oc$  for Germany. We may call  $OC$  or  $oc$  line the *economic growth path*. According to the amount of resources put in, a country will grow or shrink along the economic growth path unless there happens any foreign trade or change in utility function (or tastes) and in production function (or technological improvements).

Before the opening of trade, as it is seen in Fig. 3, the consumer's contract curve  $Cc$  is not parallel to the producer's contract curve  $Oo$ . Let us move German production fan and utility surface keeping the former in touch with English production fan until the consumer's contract curve,  $Cc'$ , is parallel to the producer's contract curve  $Oo'$ . As a result of the movement, German origin  $o$ , its initial equilibrium point  $K$ , and its bliss-point  $c$ ,

will respectively move to  $d'$ ,  $k'$ , and  $c'$ .

The German production fan,  $d'a'b'$ , touches the English production fan  $OAB$ , at  $P$  which is on the producer's contract curve  $Oo'$ . Passing through  $P$ , let us draw a line  $aa'$  perpendicularly at  $Q$  to the consumer's contract curve  $Cc'$ . At  $Q$  one of English indifference curves,  $II$ , touches one of German indifference curves,  $ii$ , and both are tangent to the international price line  $aa'$ .  $P$  is the post-trade production point and  $Q$  is the post-trade consumption point for both countries.  $P$  and  $Q$  satisfy such double equi-marginal condition of international equilibrium that the marginal rate of production substitution for each country and the marginal rate of consumption substitution for each country are common and the same as the international price ratio. The double equi-marginal condition satisfies the double maximisation of entrepreneurial surplus and satisfactions.

The difference between production and consumption in one country will be exchanged for that in other. In other words,  $PM$  of English E-goods is exchanged for  $MQ$  of German G-goods, the ratio of them being equal to the international price ratio. The trade is therefore balanced.

The gain from the trade may be seen in two aspects. Firstly, the trade gives rise to the entrepreneurial surplus for both countries. Passing through  $K$ , let us draw a line  $HK$  in parallel to the line  $aa'$ . Then, we find the entrepreneurial surplus for England as  $PH$  in terms of E-goods (numéraire). Let us draw a horizontal line through  $k'$ , and let the intersection of that line with  $aa'$  line be  $r$ . Then, we find the entrepreneurial surplus for Germany as  $k'r$  in terms of E-goods.

Secondly, the trade gives more satisfactions to both countries. This is shown by the fact that the indifference curve has moved from the initial one to a higher order one, i.e., from  $I$  to  $II$  for England and from  $i$  to  $ii$  for Germany. The increase in satisfactions is also shown by the fact that the radius of consumption indifference curves which are represented by concentric circle becomes smaller, i.e., from  $CK$  to  $CQ$  for England and from  $cK=c'k'$  to  $c'Q$  for Germany.

It is important to recognise that the increase in satisfactions cannot be attained without the maximisation of the entrepreneurial surplus.

We have explained in the above with reference to Fig. 3 a case in which both countries maintain full employment and attain the equilibrium of international trade. It is, however, possible that, because of the shortage of effective demand on the part of a country as a whole, one of or both countries attain the equilibrium of international trade by leaving some resources unused.

### III. The Compound Offer Curve

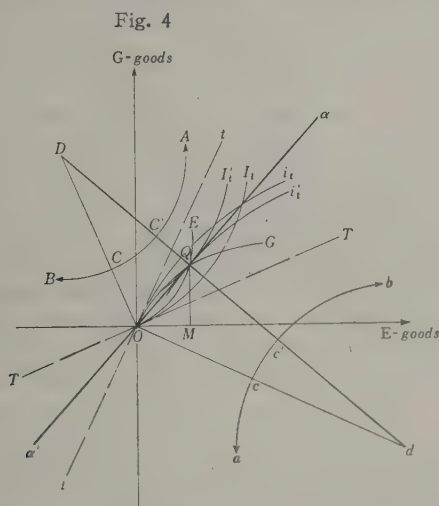
If a reciprocal demand and supply curve or offer curve is drawn as the locus of points of tangency of consumption indifference curves to price



lines which pass through an origin, it is Hicksian price-consumption curve.<sup>7</sup> The offer curve of that nature is presented by Leontief.<sup>8</sup> Since it does not involve any change in production due to the opening of trade, it may be called a *simple offer curve*. It is questionable whether the offer curve drawn by Marshall<sup>9</sup> or Edgeworth<sup>10</sup> is that kind of offer curve or a more complex one which comprises not only changes in consumption but also changes in production due to the opening of trade. It seems to the author that the latter alternative is true.

Let us call the offer curve involving changes both in consumption and production a *compound offer curve*. The compound offer curve is, first, drawn by Baldwin<sup>11</sup> as the locus of vectors between production and consumption points for each price ratio, when those vectors are redrawn from an origin.

Meade<sup>12</sup> was the second who drew the compound offer curve. He draws the *trade indifference curve* as the locus of movement of the origin of production fan when the production fan is slid along a consumption indifference



<sup>7</sup> J. R. Hicks, *Value and Capital*, Oxford, 1939, p. 30.

<sup>8</sup> Wassily W. Leontief, "The Use of Indifference Curves in the Analysis of Foreign Trade," *Readings*, *op. cit.*, p. 231, Fig. 2.

<sup>9</sup> Alfred Marshall, *The Pure Theory of Foreign Trade*, 1879, reprinted in No. 1 in Series of Reprints of Scarce Tracts in Economics and Political Science, London School of Economics, 1930; and *Money, Credit and Commerce*, London, 1923, Appendix J.

<sup>10</sup> F. Y. Edgeworth, "The Pure Theory of International Trade," *Economic Journal*, 1894, p. 25, Fig. 1.

<sup>11</sup> R. E. Baldwin, "Equilibrium in International Trade: A Diagrammatic Analysis," *op. cit.*, p. 751, Fig. 2.

<sup>12</sup> J. E. Meade, *A Geometry of International Trade*, *op. cit.*, Figs. I-IV and Chap. II.

ence curve by keeping them in touch. Then, the compound offer curve is drawn as the locus of tangency of the trade indifference curves to price lines which pass through an origin.

The trade indifference curves and compound offer curve may be easily drawn under our simplified assumption that consumption indifference curves and production transformation curves are both concentric circles.

In Fig. 4, let us draw the pre-trade equilibrium price line for England,  $TT'$ . Let the economic growth path for England be  $OD$ , which is perpendicular at  $O$  to  $TT'$  line. The English economic growth path,  $OD$ , consists of two parts: the pre-trade radius of consumption indifference curves,  $OC$ , which is  $KC$  in Fig. 3, and the pre-trade radius of production transformation curve, which is  $OK$  in Fig. 3. The production transformation curve is shown as  $AB$ . Let us draw a concentric circle with  $D$  as its center. Then, we have trade indifference curves for England,  $I_t$ ,  $I'_t$ , etc.

The pre-trade price line  $TT'$ , is tangent at  $O$  to the trade indifference curve  $I_t$ . The line  $TT'$  is parallel to a tangent line at  $C$  to the production transformation curve,  $AB$ . The line  $TT'$  is also tangent at  $O$  to one of consumption indifference curves, the center of which is  $C$ . Therefore, the double equi-marginal condition required for the pre-trade equilibrium is satisfied.

Similarly, let us re-draw the economic growth path for Germany,  $oc$  in Fig. 3, as  $Od$  in Fig. 4. Then, we may draw the trade indifference curves for Germany,  $i_t$ ,  $i'_t$ , etc., with  $d$  as its center.

It is now easy to draw the compound offer curve for each country as the locus of points of tangency of the trade indifference curves to price lines which pass through the origin  $O$ , i.e., the curve  $OE$  for England and curve  $OG$  for Germany. The international equilibrium point may be found as the intersection of the two compound offer curves,  $Q$ .

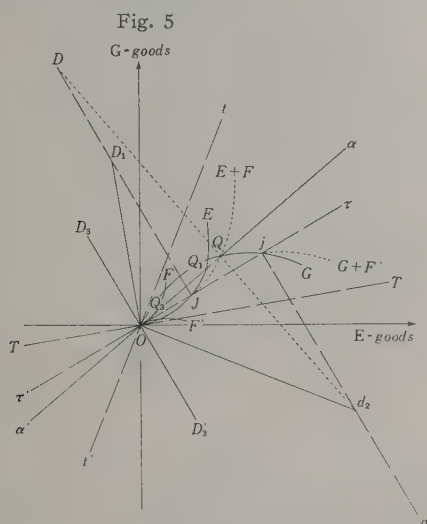
The international equilibrium point  $Q$  may, however, be found in another way. Let us connect the center of trade indifference curves of the two countries. Then we have a compound contract curve  $Dd$ . Let us draw the international price line  $aa'$  passing through  $O$  perpendicularly at  $Q$  to the line  $Dd$ . Let us mark  $M$  as the intersection of vertical line through  $Q$  with horizontal line through  $O$ . Thus, it is clear that  $OM$  of English E-goods is exchanged for  $MQ$  of German G-goods at the price ratio, the slope of the line  $aa'$ .

At the international equilibrium point  $Q$ , the trade indifference curve of each country,  $I'_t$  for England and  $i'_t$  for Germany, is tangent to each other and to the international price line  $aa'$ . Also at  $Q$ , one of English consumption indifference curves, the center (bliss-point) of which is  $C'$ , touches one of the German consumption indifference curves, the center of which is  $c'$ , and both are tangent to the international price line  $aa'$ . A tangent at  $C'$  to an English production transformation curve  $AB$ , is parallel

to a tangent at  $c'$  to a German production transformation curve  $ab$ , and both are parallel to the international price line,  $\alpha\alpha'$ . Therefore, the double equi-marginal condition required for the international equilibrium is satisfied.

A movement from  $C$  to  $C'$  along an English production transformation curve or from  $c$  to  $c'$  along a German production transformation curve is the same as the movement of production point from  $K$  to  $P$  for England or from  $k'$  to  $P$  for Germany in Fig. 3. It is important to recognise in Fig. 4 that the utility surface for each country moves according to the changes in production as it is shown by the movement of the bliss-point for each country.

The gain from the trade is shown by the fact that the trade indifference curve changes from the pre-trade one to a higher order one, i.e., from  $It$  to  $It'$  for England and from  $it$  to  $it'$  for Germany. This fact is also measured by the shortening of the radius of the trade indifference curves from  $DO$  to  $DQ$  for England and from  $dO$  to  $dQ$  for Germany.



A three (or many) country trade<sup>13</sup> can be explained in similar way as in Fig. 4. In Fig. 5, the pre-trade price line, the economic growth path, and the compound offer curve for England are respectively  $TT'$ ,  $OD_1$ , and  $OE$ ; and those for Germany are  $tt'$ ,  $od_2$ , and  $OG$  respectively. Let us suppose a third country, say France. The pre-trade price line for France is  $\tau\tau'$ , the economic growth path is either  $OD_3$  or  $OD_3'$ , both being equal, while the compound offer curve is either  $OF$  or  $OF'$ . If the international price ratio becomes more favorable to E-goods than the slope of the line

<sup>13</sup> Cf. G. S. Becher, "A Note on Multi-Country Trade," *American Economic Review*, Sept. 1952, pp. 567-568.



$\tau\tau'$ , then France will trade in the same line as England does and, consequently,  $OD_3$  and  $OF$  are effective. If the international price line becomes more favorable to G-goods than the slope of the line  $\tau\tau'$ , then France will trade in the same line as Germany does and, consequently,  $OD_3'$  and  $OF'$  are effective.

Let us draw a line  $DJ$  passing through  $D_1$  perpendicularly at  $J$  to the line  $\tau\tau'$ , the line  $DJ$  being necessarily parallel to the line  $OD_3$ . Further let  $DD_1$  be equal to  $D_3O$ . Until the international price ratio changes from the slope of the line  $TT'$  (English pre-trade price line) to the slope of the line  $\tau\tau'$ , France cannot compete with England. Therefore, the quantity of trade of E- and G-goods shown by vector  $OJ$  is the non-competing quantity of England over France. Once the international price ratio becomes more favorable to E-goods than the slope of the line  $\tau\tau'$ , France can export E-goods and import G-goods in competition with England in exporting E-goods and importing G-goods. Then, the total of offer curves of England and France will be shown by a dotted curve  $E+F$ , which is drawn from the total trade indifference curves of England and France which take  $D$  as center.

Similarly, let us draw a line  $dj$  so as to pass through  $d_2$  and to be perpendicular at  $j$  to the line  $\tau\tau'$ , line  $dj$  being necessarily parallel to the line  $OD_3'$ , and let  $dd_2$  be equal to  $D_3'O$ . Until the international price ratio changes from the slope of the line  $tt'$  (German pre-trade price line) to the slope of the line  $\tau\tau'$ , France cannot compete with Germany in exporting G-goods and importing E-goods. Therefore, the quantity of E- and G-goods shown by vector  $Oj$  is the non-competing quantity of trade of Germany over France. Once the international price ratio becomes more favorable to G-goods than the slope of the line  $\tau\tau'$ , France can export G-goods and import E-goods in competition with Germany. Then, the total of offer curves of Germany and France will be shown by a dotted curve  $G+F'$ , which is drawn from the total trade indifference curves of Germany and France which take  $d$  as center.

Now the international equilibrium between the three countries may be easily determined. Firstly, the trade equilibrium point is found as the intersection  $Q$  of English-and-French offer curve  $E+F$ , with German offer curve  $OG$ .<sup>14</sup> Secondly, let us connect the center of English-and-French trade indifference curves,  $D$ , and the center of German trade indifference curves,  $d_2$ . We have then a compound contract curve between the three countries,  $Dd_2$ . Let us draw the international price line  $aa'$ , so as to pass through the origin  $O$ , and to be perpendicular at  $Q$  to the line  $Dd_2$ .  $Q$  is the international equilibrium point.

At the international equilibrium point  $Q$ , one of English-and-French trade

<sup>14</sup> It may be of no need to mention that  $OF'$  and  $G+F'$  offer curves are not effective, since the dotted offer curve,  $G+F'$ , does not intersect with  $OE$  offer curve.

indifference curves, the center of which is  $D$ , touches one of German trade indifference curves, the center of which is  $d_2$ , and both are tangent to the international price line  $aa'$ . The equilibrium quantity of trade of England-and-France for Germany is shown by vector  $OQ$ . One of English trade indifference curves, the center of which is  $D_1$ , is tangent at  $Q_1$  to the international price line  $aa'$ . Therefore, the quantity of trade for England is shown by vector  $OQ_1$ . One of French trade indifference curves, the center of which is  $D_3$ , is tangent at  $Q_3$  to the international price line  $aa'$ . Therefore, the quantity of trade for France is shown by vector  $OQ_3$ . The total of vectors  $OQ_1$  and  $OQ_3$  equals the vector  $OQ$ .

Under such simplified assumptions that both production transformation curves and consumption indifference curves are concentric circles, the maximum principle of the entrepreneurial surplus and that of satisfactions for the two countries, which are required for the equilibrium of international trade, are geometrically analysed, first each principle separately and then simultaneously.

The simplified geometrical analysis makes charting easy and exact. It is particularly useful to draw the compound offer curve and to extend the analysis to a three or many country trade. It will be efficiently applied to the further analysis of transfer problem, optimum tariff, technological improvement, economic growth, and so forth.

If it is assumed that both production transformation curves and consumption indifference curves are not concentric circles, the analysis in this paper ought to be modified accordingly.<sup>15</sup> The equilibrium conditions required, however, remain unaltered as in this paper.

## APPENDIX

### *Model I: Pure Specialisation Exchange*

Let us suppose that two countries exchange between each other the increment of production, in which each country has comparative advantage, so as to maximise their entrepreneurial surplus. The entrepreneurial surplus is the difference between the revenue from export and its cost required. Then, we have a pure specialisation exchange model.

Let  $A$ ,  $B$  stand for the initial quantities of production of E-goods and G-goods for the first country (England) and  $a$ ,  $b$  for the second country (Germany),  $X$  for the increment of production of E-goods in England and  $Y$  for the quantity of G-goods which can be produced with the same amount of resources as required to produce  $X$ . Similarly, let  $y$  stand for the increment of production of G-goods in

<sup>15</sup> Such an equilibrium condition that the international price line is perpendicular to contract lines ought to be shown that an international price line is perpendicular to the tangent of contract curves.

Germany and  $x$  for the quantity of E-goods which can be produced with the same amount of resources as required to produce  $y$ . Let us further suppose that  $X$  is exchanged for  $y$  at a price ratio,  $p$ , which is the quantitative exchange ratio of E-goods (numéraire) per unit of G-goods.<sup>16</sup>

The production functions for each country are written

$$(1.1) \quad G(A+X, B-Y)=N \text{ (constant),}$$

$$\text{where } \frac{d(B-Y)}{d(A+X)} < 0, \text{ and } \frac{d^2(B-Y)}{d(A+X)^2} < 0, \text{ or, since } A \text{ and } B \text{ are constant,}$$

$$\frac{dY}{dX} > 0, \text{ and } \frac{d^2Y}{dX^2} > 0.$$

$$(1.2) \quad g(a-x, b+y)=n \text{ (constant),}$$

$$\text{where } \frac{d(b+y)}{d(a-x)} < 0, \text{ and } \frac{d^2(b+y)}{d(a-x)^2} < 0, \quad \text{or } \frac{dy}{dx} > 0 \quad \text{and } \frac{d^2y}{dx^2} > 0.$$

$N$  and  $n$  stand for a given amount of composite unit of factors of production for each country.

Let the entrepreneurial surplus for each country be

$$(1.3) \quad V = X - pY,$$

$$(1.4) \quad v = p - x.$$

Subject to (1.1), maximise  $V$ . Then, we have

$$W = V + A[N - G(A+X, B-Y)],$$

$$(1.5) \quad \frac{\partial W}{\partial X} = 0, \quad 1 - A \frac{\partial G}{\partial(A+X)} = 0, \quad \therefore A = 1 / \frac{\partial G}{\partial(A+X)}.$$

$$(1.6) \quad \frac{\partial W}{\partial Y} = 0, \quad -p + A \frac{\partial G}{\partial(B-Y)} = 0, \quad \therefore A = p / \frac{\partial G}{\partial(B-Y)}.$$

$$(1.7) \quad p = \frac{\partial G}{\partial(B-Y)} / \frac{\partial G}{\partial(A+X)}.$$

Similarly, subject to (1.2), maximise  $v$ . Then, we have

$$w = v + \lambda [n - g(a-x, b+y)],$$

$$(1.8) \quad \frac{\partial w}{\partial x} = 0, \quad -1 + \lambda \frac{\partial g}{\partial(a-x)} = 0, \quad \therefore \lambda = 1 / \frac{\partial g}{\partial(a-x)}.$$

$$(1.9) \quad \frac{\partial w}{\partial y} = 0, \quad p - \lambda \frac{\partial g}{\partial(b+y)} = 0, \quad \therefore \lambda = p / \frac{\partial g}{\partial(b+y)}.$$

$$(1.10) \quad p = \frac{\partial g}{\partial(b+y)} / \frac{\partial g}{\partial(a-x)}.$$

From (1.1) and (1.7), it follows

$$(1.11) \quad X = X(p), \quad Y = Y(p).$$

Similarly, from (1.2) and (1.10), it follows

$$(1.12) \quad x = x(p), \quad y = y(p).$$

We have an exchange equation

$$(1.13) \quad X - pY = 0, \quad \text{or } X(p) - pY(p) = 0,$$

which determines the equilibrium value of  $p$ . By substituting the equilibrium value of  $p$  in (1.11) and (1.12), we have the equilibrium values of  $X$ ,  $Y$ ,  $x$  and  $y$ . Then,

<sup>16</sup> In this appendix, capital letters refer to the first country (England) and small letters to the second country (Germany) except  $p$ .



we obtain the equilibrium value of revenue,  $A+p(B-Y+y)$  for England and  $(a-x+X)+pb$  for Germany.

### Model II: Compound Exchange

Let us suppose that two countries maximise their entrepreneurial surplus, spending their revenue which includes the maximised entrepreneurial surplus, and also maximise their total utilities. Then, we have a compound exchange model.

As in Model I, subject to production functions

$$(2.1) \quad G(A+X, B-Y)=N,$$

$$(2.2) \quad g(a-x, b+y)=n,$$

maximise  $V$  and  $v$ . Then, we have

$$(2.3) \quad p = \frac{\partial G}{\partial(B-Y)} / \frac{\partial G}{\partial(A+X)}.$$

$$(2.4) \quad p = \frac{\partial g}{\partial(b+y)} / \frac{\partial g}{\partial(a-x)}.$$

$$(2.5) \quad X=X(p), \quad Y=Y(p).$$

$$(2.6) \quad x=x(p), \quad y=y(p).$$

Let us suppose that consumers in England choose to consume  $A+X-\bar{X}$  and  $B-Y+Y$  and consumers in Germany  $a-x+\bar{x}$  and  $b+y-\bar{y}$  so as to maximise their satisfactions.  $\bar{X}$  is English excess supply of E-goods and  $\bar{Y}$  its excess demand for G-goods, and  $\bar{x}$  is German excess demand for E-goods and  $\bar{y}$  its excess supply of G-goods.

Budget equations for each country with reference to the foreign trade may be written

$$(2.7) \quad X=pY.$$

$$(2.8) \quad \bar{x}=p\bar{y}.$$

Let the utility functions for each country be

$$(2.9) \quad U=F(A+X-\bar{X}, B-Y+Y),$$

where  $\frac{d(B-Y+Y)}{d(A+X-\bar{X})} < 0$ , or, since  $A$  and  $B$  are constant and since  $X$  and  $Y$  are

given for consumers,  $-\frac{d\bar{Y}}{dX} < 0$ , and  $\frac{d^2(B-Y+Y)}{d(A+X-\bar{X})^2} = \frac{d^2Y}{dX^2} > 0$ .

$$(2.10) \quad u=f(a-x+\bar{x}, b+y-\bar{y}),$$

where  $\frac{d(b+y-\bar{y})}{d(a-x+\bar{x})} = -\frac{d\bar{y}}{d\bar{x}} < 0$ , and  $\frac{d^2(b+y-\bar{y})}{d(a-x+\bar{x})^2} = \frac{d^2\bar{y}}{d\bar{x}^2} > 0$ .

Subject to (2.7), maximise  $U$ . Differentiating  $F+A(\bar{X}-p\bar{Y})$  with reference to  $\bar{X}$  and  $\bar{Y}$ , we have

$$-\frac{\partial F}{\partial(A+X-\bar{X})} + A=0, \quad \frac{\partial F}{\partial(B-Y+Y)} - Ap=0.$$

Therefore,

$$(2.11) \quad p = \frac{\partial F}{\partial(B-Y+Y)} / \frac{\partial F}{\partial(A+X-\bar{X})}.$$

Similarly, subject to (2.8), maximise  $u$ . Then, we have

$$(2.12) \quad p = \frac{\partial f}{\partial(b+y-\bar{y})} / \frac{\partial f}{\partial(a-x+\bar{x})}.$$

From (2.7) and (2.11), it follows

$$(2.13) \quad \bar{X}=X(p), \quad \bar{Y}=Y(p).$$

Similarly, from (2.8) and (2.12), it follows

$$(2.14) \quad \bar{x} = \bar{x}(p), \quad \bar{y} = \bar{y}(p).$$

Since in the equilibrium of international trade English export (or excess supply) of E-goods is equal to German import (or excess demand) for the same commodity, we have

$$(2.15) \quad \bar{X}(p) = \bar{x}(p).$$

By substituting (2.15) in (2.7) and (2.8), we obtain

$$(2.16) \quad \bar{Y}(p) = \bar{y}(p).$$

Thus, the equilibrium value of  $p$  is determined either by (2.15) or by (2.16).

Let us denote equilibrium values by suffix  $_0$ . Then, for England, the equilibrium value of production is

$$(A + X_0) + p_0(B - Y_0),$$

and that of consumption is

$$(A + X_0 - \bar{X}_0) + p_0(B - Y_0 + \bar{Y}_0).$$

The two values are equal, since

$$X_0 = p_0 \bar{Y}_0,$$

by equation (2.7).

Similarly, for Germany, the equilibrium value of production is

$$(a - x_0) + p_0(b + y_0),$$

and that of consumption is

$$(a - x_0 + \bar{x}_0) + p_0(b + y_0 - \bar{y}_0).$$

The two values are equal, since

$$\bar{x}_0 = p_0 \bar{y}_0,$$

by equation (2.8).

# A SIMPLE MODEL OF MACRO-ECONOMIC DYNAMICS

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## I

It is well known today that the modern macro-economic dynamics can be divided into two main approaches—Hicksian equilibrium approach and Harrodian disequilibrium approach.

Let  $I$  and  $S$  be respectively Investment (demand for new capital) and Saving (supply of new capital). The equilibrium approach regards the economic reality as the “moving equilibrium process” of  $I=S$  and the equilibrium level of national income, which can be calculated by solving  $I=S$ , is supposed to represent the actual level of national income. The equilibrium approach is further characterised by its little or no concern with the process through which the national income or products are produced. Therefore, the effective demand is the only factor which determines the actual process of national economy. At any rate, if the equilibrium approach should be justified, this theory has to prove the stability of the moving equilibrium process.

On the other hand, the disequilibrium approach admits the possibility of  $I=S$ . But, once the equation  $I=S$  fails to hold, this theory denies the existence of any mechanism which counterbalances the disequilibrium process instantly. On the contrary, according to this theory, such a counterbalancing effort has the effect of enlarging the disequilibrium position, and this disequilibrium process is itself supposed to be the phenomena of business fluctuations, i.g. if  $I>S$ , it means the prosperity, and if  $S>I$ , the depression.

In this connection, we remember that the disequilibrium theory is closely related with the theory of Wicksellian cumulative process resulting from the discrepancy between the natural and monetary interest rates. Of course, it is to be remarked that in Wicksell's theory the main variable is assumed to be the general price level of commodities. But, the identification of the lack of equilibrium as represented in  $I=S$  with the business fluctuations of the national economy has certainly originated from Wicksell.

Then, why is the national economy not provided with any mechanism which could instantly counterbalance the lack of equilibrium? As will be shown in the following, this is explained by the consideration of the correspondence between the effective demand and effective supply restricted by capital. We find many difficulties involved in the equilibrium approach,



because it does not take into consideration the supply side of the national income. Therefore, we are forced to give more weight to the disequilibrium theory, which takes up as subject of analysis the interrelation between the effective demand and supply. In what follows, we shall be concerned with a systematic presentation of some results obtained about macro dynamics from the standpoint of the disequilibrium theory.

## II

In order to simplify the following observations, the influences of the change of commodity prices will not be taken into consideration. The variables to be used are therefore all real quantities deflated by some suitable commodity price indices.

In the first place, let  $K(t)$  be the national capital at the beginning of the  $t$ -th period. Taking into consideration suitable idle capacity, we suppose  $Y(t)$  will be obtained from  $K(t)$ , where  $Y(t)$  denotes the national income during the  $t$ -th period. If there exists between  $K(t)$  and  $Y(t)$  such a linear and homogeneous relation that in case  $K(t)$  is doubled,  $Y(t)$  is doubled too, the relation in question is expressed as

$$Y(t) = \sigma K(t), \dots\dots\dots (1)$$

where  $\sigma$  is the production coefficient of capital. Of course, this coefficient depends upon the idle capacity as well as upon the technological conditions and the structure of capital equipments. For the following discussion, it is sometimes more convenient to use  $\frac{1}{\sigma} = c$  for  $\sigma$ . In this case,

$$K(t) = c Y(t) \dots\dots\dots (2)$$

is obtained and  $c$  is again called the capital coefficient.

Now, a part of the national products thus produced is consumed as national consumption, while the remaining part constitutes the new capital accumulation as national saving. Let the saving during the  $t$ -th period be  $S(t)$ . We suppose for simplicity that the saving is a linear homogeneous function of the national income. Then we get the equation

$$S(t) = s Y(t), \dots\dots\dots (3)$$

where  $s$  is called the saving ratio. Of course, the saving ratio is dependent upon the distributive structure of the national income as well as upon the social customs. But, such a complication will not be taken into consideration here in this paper.

Next, let the demand for new capital at the  $t$ -th period be  $I(t)$ . In equilibrium, it must be equal to the amount of saving at the same period. Thus, the equation

$$I(t) = S(t) \dots\dots\dots (4)$$

expresses the macro-equilibrium condition of the national economy. Then, what does the behaviouristic equation about  $I(t)$  look like? In case the capital equipments are fully at work with suitable idle reserve, we assume that  $I(t)$  is proportional to the difference of  $Y(t)$  and  $Y(t-1)$ , i. e.  $\Delta Y(t) = Y(t) - Y(t-1)$ . Let the coefficient of the proportion be  $v$ , then

$$I(t) = v \Delta Y(t) \dots\dots\dots (5)$$

is the equation for investment, where the coefficient  $v$  is called the acceleration coefficient. As will be shown in what follows, there exists a definite relationship between  $v$  and  $c$  (or  $\sigma$ ) with respect to the realization of developmental equilibrium. However, we have to be careful not to confuse these two notions. In particular, it seems to the author that many contemporary authors about macro-dynamics have failed to distinguish these two concepts.

Now, there remains finally the task to clarify the definition about the time unit. With this in view, let us define the unit period as

“the interval from the time when the national product is produced as a result of the utilization of the national capital  $K$  up to the time when the national capital  $\Delta K$  corresponding to the investment is again accumulated.”

As a consequence of this definition, we obtain the following equation in equilibrium ;

$$K(t) + I(t) = K(t+1),$$

from which we can easily conclude

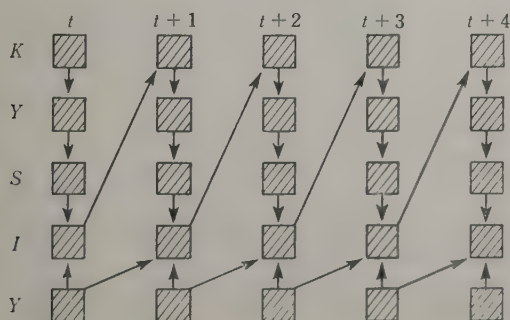
$$I(t) = K(t+1) - K(t) = \Delta K(t+1). \dots\dots\dots (6)$$

Sometimes, the unit period is defined by means of

$$I(t) = \Delta K(t) \quad \therefore K(t-1) + I(t) = K(t).$$

However, the proposed definition means that *the capital goods to be produced is calculated in advance in the original national capital necessary for produc-*

Fig. 1







$$I(t) = v \Delta Y(t) \dots\dots\dots (5)$$

$$I(t) = c \Delta Y(t+1) \dots\dots\dots (7)$$

As is easily seen, the variables of this system are three (i.e.  $Y$ ,  $S$  and  $I$ ), but the equations are four in number. Therefore, this system seems to be *over-determined*.

However, this over-determination can be easily avoided, when we observe that in developmental equilibrium the capital coefficient  $c$  and the acceleration coefficient  $v$  are linearly dependent upon each other, if the saving coefficient  $s$  is given.

In order to analyse the relation between the capital and acceleration coefficients, let us observe the following simultaneous equations;

$$(A) \begin{cases} S(t) = sY(t) \dots\dots\dots (3) \\ I(t) = S(t) \dots\dots\dots (4) \\ I(t) = c \Delta Y(t+1), \dots\dots\dots (7) \end{cases}$$

where three variables are uniquely determined by three equations. Solving with respect to  $Y$ , we have

$$c \Delta Y(t+1) = sY(t).$$

Let the national income at the  $o$ -th period be  $Y(o)$ . Then we have a general solution

$$Y(t) = \left[ \frac{c+s}{c} \right]^t Y(o) = \left[ 1 + \frac{s}{c} \right]^t Y(o), \dots\dots\dots (8)$$

Clearly,  $s > 0$  and  $c > 0$ , from which we easily conclude that the economic system will expand at the rate of  $g$  to be defined as follows:

$$\frac{s}{c} = g. \dots\dots\dots (9)$$

This growth rate is in fact nothing but the so-called warranted rate of growth as defined by Harrod.

Next, we can present the following equation system,

$$(B) \begin{cases} S(t) = sY(t) \dots\dots\dots (3) \\ I(t) = S(t) \dots\dots\dots (4) \\ I(t) = v \Delta Y(t), \dots\dots\dots (5) \end{cases}$$

from which we obtain,

$$v \Delta Y(t) = sY(t). \dots\dots\dots (10)$$

From (10), we further obtain the following general solution of  $Y(t)$  with respect to  $Y(o)$  as initial condition,

$$Y(t) = \left[ \frac{v}{v-s} \right]^t Y(o) = \left[ 1 + \frac{s}{v-s} \right]^t Y(o). \dots\dots\dots (11)$$

As is easily seen, in case  $v < s$ , the national income level is respectively positive and negative at the period of even and odd order, as far as  $Y(o) > 0$ .

This conclusion is seemingly very queer, if the developmental equilibrium should always have a positive accumulation of capital.

Inquiring into the relation between the capital and acceleration coefficients, we know that  $v < s$  would never occur. From (8) and (11), we easily obtain the following relation,

$$\left( \frac{v}{v-s} \right) = \left( \frac{c+s}{c} \right)$$

which is further equivalent to the expression

$$v = c + s \dots \dots \dots (12)$$

It is clearly seen that,  $v > s$  is true, i.e. the acceleration coefficient is larger than the saving ratio, as far as the capital coefficient  $c$  remains positive. Therefore, the possibility of the above-mentioned queer conclusion is completely ruled out. At any rate, the relation

$$\text{acceleration coefficient} = \text{capital coefficient} + \text{saving ratio}$$

holds true in the developmental equilibrium. It is to be remarked that  $v$  and  $c$  are the different notions from each other. In other words, the acceleration coefficient  $v$  is a parameter which determines the behavior of the demand for new capital, when the informations are given on the present and past movements of the national products. On the other hand, the capital coefficient  $c$  is another structural parameter which explains the productivity of the national capital.

Now, let  $c$  and  $s$  be given. In equilibrium, the equation (12) must hold. In terms of economics, this means that the effective supply restricted by the capital determines the development of the national economy, while the effective demand only follows the development thus determined. Next, let  $v$  and  $s$  be given. Again this means that the effective demand is responsible for determining the development of the national economy, while the effective supply is linearly dependent upon the course thus determined. In equilibrium—it is a characteristic of equilibrium—it does not make any difference which parameter is taken as linearly dependent upon another.

Up to now, we have been concerned with the analysis of the developmental equilibrium as represented by  $I=S$ . The national economy will keep its steady growth rate through the accumulation of capital as far as  $I=S$  holds true. It should be remembered that such a long term growth rate is not given externally as in the Hicksian theory, but is accounted for within the system in terms of the saving, acceleration and capital coefficients.

Then what will happen when the national economy falls into  $I \neq S$ ? If the equilibrium is instantaneously recovered,  $I=S$  represents a stable equilibrium. Otherwise, the equilibrium would be unstable. In order to investigate the situation more in detail, it is necessary to analyse the property of the capital coefficient or the production coefficient of capital.

In general, the enterpriser reserves a certain amount of idle capacity in anticipation of unexpected increase of demand. Let the capacity reserve rate be  $\lambda\%$  (for instance 40%) of the national capital  $K$ . Of course, this rate cannot be beyond unit, so

$$I > \lambda > 0.$$

In case  $\lambda=\lambda=0$ , *i.e.* when the capital equipments fully work within their physical limits, let the production coefficient  $\sigma$  be  $\bar{\sigma}$ . Of course,  $\bar{\sigma} > \sigma > 0$ . In other words, the smaller the reserve rate, the larger the productivity. Thus, when a proper reserve rate is taken into consideration, we have about  $\sigma$  the following relation,

$$\sigma = \bar{\sigma}(I - \lambda). \dots\dots\dots (13)$$

We remember that we have defined the production coefficient of capital as inverse of the capital coefficient. As is easily obtained from the equation (9), we get

$$g = \frac{s}{c} = \sigma s = \bar{\sigma}(I - \lambda)s. \dots\dots\dots (14)$$

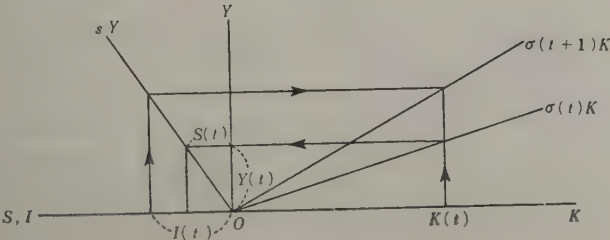
From this equation, we know that the smaller the proper reserve rate of capital  $\lambda$ , the larger the growth rate of the national income  $g$ , as far as other things remain constant.

Now, suppose the equation  $I=S$  remains maintained until up to the  $(t-1)$ -th period and  $I$  surpasses  $S$  at the  $t$ -th period for some reason (*e. g.* by the sudden innovation). We then make the following plausible assumption with respect to the behavior of the enterpriser;

“In case there takes place a discrepancy between investment and saving at the  $t$ -th period, the working rate of capital at the  $(t+1)$ -th period will be the rate which produces the income level necessary for yielding the corresponding supply of saving.”

The meaning of this assumption is well-illustrated in Fig. 3. Suppose  $Y(t)$  is produced from  $K(t)$  and  $S(t)$  is supplied from  $Y(t)$ . By the assumption,  $I(t) > S(t)$ , which is shown in the left side of the figure. As is clear from the figure, the enterpriser should have had the higher working rate

Fig. 3



of capital in order to be  $S(t)=I(t)$ . Of course, it would be difficult to determine exactly the working rate of capital at the  $(t+1)$ -th period by means of this figure. However, the existence of such a tendency is highly plausible, when we remember that a part of the capital capacity is reserved in anticipation of such a situation.

Then, what kind of relationships exists between these two production coefficients? With this respect, we can prove the following equation,

$$\sigma(t+1) = \sigma(t) \frac{I(t)}{S(t)}, \dots\dots\dots (15)$$

from which we obtain  $\sigma(t+1) > \sigma(t)$  when  $I(t) > S(t)$

$\sigma(t+1) < \sigma(t)$  when  $I(t) < S(t)$ .

If the constancy is assumed about  $\bar{\sigma}$  for the technical reason, these inequalities hold only by means of highering or lowering the working rate of capital.<sup>1</sup>

The lack of equilibrium between the investment and saving is thus responsible for the change of the working rate of capital to adjust the broken equilibrium. However, we show next that such an adjustment will in reali-

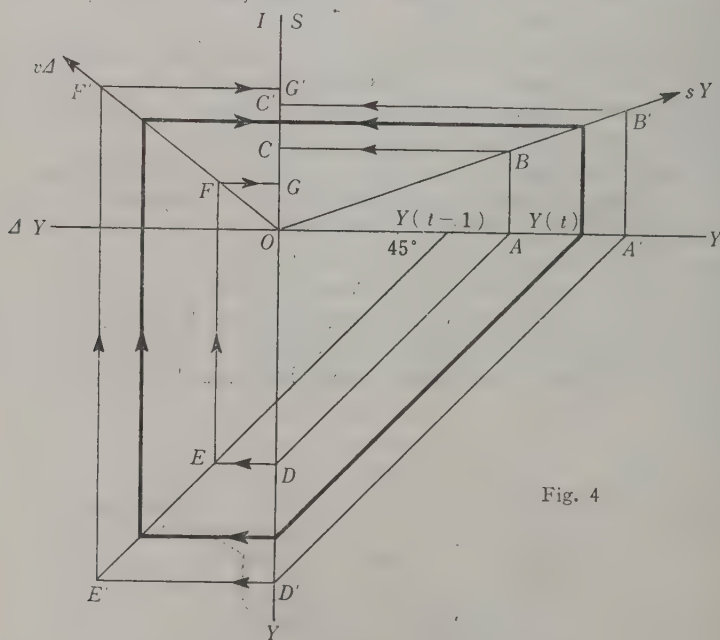


Fig. 4



ty have an effect of rather promoting the lack of equilibrium between the investment and saving.

In Fig. 4, the bold line indicates that the national income grows from  $Y(t-1)$  to  $Y(t)$  at the growth rate sufficient to realize  $I(t)=S(t)$ . If  $Y(t)$  happens to be at the point  $A$  for some reason, the national saving is given by the point  $C$  passing through  $ABC$ , while the national investment is located at the point  $G$  going through  $DEFG$ . In other words, we have  $I(t)<S(t)$ . On the other hand, if  $Y(t)$  happens to be at  $A'$ , the national saving is given by  $C'$  passing through  $A'B'C'$ , while the national investment is at  $G'$  going through  $D'E'F'G'$ . In this case, we clearly have  $I(t)>S(t)$ .

From this figure, it is seen that  $I(t)<S(t)$  or  $I(t)>S(t)$  corresponds respectively to the smaller or larger growth rate of national income than that which can be obtained by solving  $I(t)=S(t)$ . This just corresponds to the case of the divergence of the actual growth rate from the warranted one as analysed by Harrod. As is easily seen from the above, the change of the working rate of capital to adjust  $I\neq S$  brings about the higher or lower level of the national income than what would be brought in case there did not take place any change. For instance, let  $I(t)>S(t)$ . By the equation (12), we have

$$\frac{I(t+1)}{S(t+1)} = \frac{v}{s} \cdot \frac{\Delta Y(t+1)}{Y(t+1)} > \frac{v}{s} \cdot \frac{\Delta Y(t)}{Y(t)} = \frac{I(t)}{S(t)}, \dots\dots\dots (16)$$

from which again by the equation (15), we obtain

$$\sigma(t+2) > \sigma(t+1) > \sigma(t). \dots\dots\dots (17)$$

Under this assumption, the absolute divergence between the investment and saving becomes larger and larger. Paradoxically speaking, the increase of the working rate of capital for the maintenance of  $I=S$  is helping to promote the failure of its maintenance and automatically strengthen the degree of utilization of capital. In short, it is clear that the process of the developmental equilibrium as expressed by  $I=S$  is unstable under the above-mentioned assumptions.

## V

We do not have any intention to develop a theory of business cycle here in this paper. We therefore wish to close the analysis with some supplementary comments on the upper bottle-neck, i.e. the ceiling which appears in the process of business cycles.

This problem has recently been made familiar to us by Hicks, Harrod and others. They conclude eventually that the full employment of labours constitutes the ceiling and checks the expansion of the national economy beyond a certain level.

We do not of course deny the possibility that the full employment of labours would constitute a ceiling to the further increase of national products. But it must be admitted that in most cases a plenty amount of unemployment is observed even amidst a boom. Rather it seems more plausible that the bottle-neck of capital constitutes the ceiling to be taken into consideration, in case there is not any external factor such as financial situations.

Making use of the above-observations, we are now in a position to make the following statement about this problem. "The technological restriction imposed upon the degree of utilization of capital, i.e. the existence of the condition  $\bar{\sigma} > \sigma$  may check the further increase of national products, even when labours are unemployed." As was already observed, the self-cumulative expansion of the working rate of capital takes place accompanying the expanding process of disequilibrium. When such a self-cumulative expansion reaches to the technologically imposed limit, it can not go on any further and we reach to the bottle-neck of the capital.

Let's summerize what has been observed. We do not understand the process of business fluctuations as the process of moving equilibrium of  $I=S$ , but as the process of the disequilibrium between the effective demand and supply, i.e. the process of  $I \neq S$ . The answer to the problem that a disequilibrium causes a further disequilibrium is found in the self-cumulative expansion of the working rate of capital. However, no systematic presentation of this problem has been attempted even by the advocates of disequilibrium theory of economic fluctuations. It seems to the author that such a lack of systematization is mainly originating from the confusion of the meaning of the acceleration coefficient and the capital coefficient as well as from the lack of detailed analysis on the working rate of capital. The present paper is a possible solution of this problem.<sup>2</sup>

<sup>1</sup> Let

$$\sigma(t)K(t)=Y(t) \dots\dots\dots (1)$$

$$\sigma(t+1)K(t)=\bar{Y}(t) \dots\dots\dots (2)$$

where  $\bar{Y}(t)$  is determined from  $sY(t)=I(t)$  in accordance with the assumption. Clearly,

$$\sigma(t)=\frac{Y(t)}{K(t)}=\frac{I}{s} \cdot \frac{S(t)}{K(t)} \dots\dots\dots (3)$$

$$\sigma(t+1)=\frac{\bar{Y}(t)}{K(t)}=\frac{I}{s} \cdot \frac{I(t)}{K(t)}, \dots\dots\dots (4)$$

from which we obtain the equation (15) by (3)÷(4).

<sup>2</sup> There are many authors who restrict the notion of the equilibrium only to the stationary state. However, we must not forget the notion of the developmental equilibrium. Therefore, we have to consider not only the stability of the static equilibrium but also that of the developmental equilibrium. It is further to be remarked that the divergence of the solution of a dynamic equilibrium does not necessarily mean the instability of the divergent process of equilibrium, because some divergent processes may be stable.

# ORIGIN AND SIGNIFICANCE OF POLITICAL ARITHMETIC<sup>1</sup>

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## I

It is generally recognized among economists and statisticians that Political Arithmetic was a method of numerical analysis in the field of social science created by J. Graunt (1620-74) and W. Petty (1623-87) in the middle of the 17th century. In the following 15 decades up to the days of A. Young (1741-1820), it brought about such far-reaching influence not only in England but on the Continent that it came to be regarded as a 'mother science, both of statistics and of political economy in England'.<sup>2</sup> The ultimate aim of this paper is to make an inquiry into the theoretical growth and social basis of Political Arithmetic and to clarify its scientific significance for us.

As was properly stated by Prof. G. N. Clark, 'it is quite wrong to think that it [Political Arithmetic] arose from the sudden application of mathematics to the investigation of society. ...it built higher a long-standing structure'.<sup>3</sup> It is however beyond the ability of the present author to inquire from all angles into the 'long-standing structure' of Political Arithmetic. He will therefore try an approach to the afore-mentioned aim mostly confining himself to the works and activities of these two pioneers. In this connection, he does not believe that the traditional method of separating the economic and statistical aspects of Political Arithmetic, though thus far adopted by many scholars, will be fruitful for his purpose. As will be shown in the sequel, Political Arithmetic had these two aspects as an

<sup>1</sup> The author wishes to express his sincere thanks for their valuable suggestions given in the course of preparing this paper to: Mr. A. T. Lucas, Hon. Gen. Secretary of the Royal Society of Antiquaries of Ireland, Dublin; Mr. H. MacAleavy, formerly in the British Museum Library and now in the University of London; Mr. E. Strauss, author of *Sir William Petty, portrait of a genius*. London, 1954; professors and colleagues in Hitotsubashi University and the Institute of Economic Research, particularly the members of the Section for Study of Classics in Economic Literature; and to Mr. M. Yoshizawa, a friend of his, who kindly translated this paper into English.

<sup>2</sup> S. Bauer, *History of Political Arithmetic*. (Palgrave's Dictionary of Political Economy. London, 1901. Vol. I.) p. 56.

<sup>3</sup> G. N. Clark, *Science and social welfare in the age of Newton*. 2nd ed. Oxford, 1949. p. 120.

inseparable entity already at its earliest stage, and herein lay the very significance of this method of social investigation. The reproduction as one entity of the intentions, arguments and activities of the co-founders, who were life-long friends to each other, and their studies in the light of their social environments constitutes therefore the very method the author wishes to adopt in this paper. For he believes that such a method of approaching will certainly contribute to the clarification of one of the key problems of us, *i.e.* the quantitative observation and qualitative understanding of socio-economic phenomena or the concrete grasping of the correlations between statistics and economics.

It was Petty himself that called this kind of approach 'Political Arithmetick' and first gave it a definite methodological outline. So far as various publications in those days indicate, Graunt was the first man who actually "observed" social phenomena by this method and took the initiative toward this direction. The activities of the co-founders during the decade or so from Graunt's *Observations* (published in 1662) to Petty's *Political Arithmetick* (written in 1671-76) therefore provide important data for the clarification of the real content and theoretical setup of Political Arithmetic.

In making a comprehensive study of the social background of Political Arithmetic which constitutes the very subject of this paper, the author believes, this sort of approach alone will lead to the complete understanding of the nature and structure of Political Arithmetic as well as the activities of the co-founders before the publication of Graunt's *Observations*, namely in the days of the Puritan Revolution and the Commonwealth, particularly the latter being more important.<sup>4</sup> With this in view, their works during about three decades from 1640 to the formulation of Political Arithmetic are chronologically listed below (after Graunt's *Observations*, only main works are mentioned):<sup>5</sup>

<sup>4</sup> As for the life and achievements of Graunt, to our great regret, little is known to us.

<sup>5</sup> All these works except 13) written by Graunt are Petty's. 1)-4), 6) and 9)-12) are included in *The Petty Papers*, ed. by the Marquis of Lansdowne. London, 1927. 2 vols. And 13)-17) are contained in Dr. C. H. Hull's *The Economic Writings of Sir William Petty*. Cambridge, 1899. 2 vols. (It must be noted here that the heading of 6) is added by the editor, and as for 9), only its heading is left on the list of writings written by Petty himself.) Figures in brackets denote the approximate years of writing estimated by the editors, and the numbers at the end indicate the Literature Numbers in *The Petty Papers*. With the exception of 5), 7) and 8), the author always refers in this paper to the works contained in the publications edited by the Marquis of Lansdowne and by Dr. Hull.

It is said that except the *Observations*, Graunt wrote something on excise and on religion, but none of them are left intact. But the *Account of the multiplication and growth of carps and salmons* he submitted to the Royal Society is included in Dr. Hull's reprinted edition. In order to make a more thorough-going inquiry into the problems, which constitute the subject of this paper, we have to take up Petty's essays in his late years, for which we have to our regret no space to spare any more.



- 1) *Holland*. (1644) (No. 132)
- 2) *History of Trades*. (1647) (No. 60)
- 3) *Observations of England*. (1647) (No. 61)
- 4) *An Explication of Trade and its Increase*. (1647) (No. 62)
- 5) *The Advice of W. P. to Mr. Samuel Hartlib for the Advancement of some Particular Parts of Learning*. (1647) London, 1648.
- 6) *(Natural Observations.)* (1652) (No. 147)
- 7) *Reflections upon some Persons and Things in Ireland*. (1659) London, 1660.
- 8) *History of the Down Survey*, ed. by T. A. Larcom. (1659) Dublin, 1851.
- 9) *Observations on the Bills of Mortality*. (1660) (No. 158)
- 10) *The Registry of Lands, Commodities, and Inhabitants*. (1660-61) (No. 25)
- 11) *Of Interest*. (1661) (No. 68)
- 12) *Interest*. (1661) (No. 69)
- 13) *Natural and Political Observations made upon the Bills of Mortality*. (1660-61) London, 1662.
- 14) *A Treatise of Taxes & Contributions*. (1661-62) London, 1662.
- 15) *Verbum Sapienti*. (1665) London, 1691.
- 16) *The Political Anatomy of Ireland*. (1671-76) London, 1691.
- 17) *Political Arithmetick*. (1671-76) London, 1690.

## II

A chronological study of these works might perhaps be the best way for presenting the main subject of this paper. But space is so limited that we shall start from Graunt's *Observations* where Political Arithmetic was first expounded, so to speak, in original form.

It goes without saying that Graunt's 'long and serious perusal of all the Bills of Mortality, which this great city [London] hath afforded for almost fourscore years'<sup>6</sup>, originated from the then prevailing social environments, i.e. the population and labour problems, with which English capitalism was confronted in its infancy—the steady concentration of urban population in line with the growth of domestic commerce and international trade, the reproduction of labour forces, the prevalence of epidemics, especially plague, which had the effect of decreasing the population, and so forth. Whatever the case might be, his long and serious study was apparently motivated by his personal interest rather than by his intention to solve these social problems. It is said that, brought up in the Puritan atmosphere, Graunt was

<sup>6</sup> *Observations*. p. 398.

a self-taught man and that he 'served with distinction' as captain of the Trained Band on the occasion of the Puritan Revolution. If we want to understand the significance of his *Observations* based upon 'a long and serious perusal of all the Bills of Mortality', the most important fact in his career we must not lose sight of is that he was a merchant, born and bred in London, who found 'in Trade the want of an universal measure'.<sup>7</sup> Little wonder that, when he seriously studied 'all the Bills of Mortality', Graunt came to believe in 'the Mathematicks of my [his] Shop-Arithmetick'.<sup>8</sup> It must be recalled here that, along with the development of the international trade of England from the latter half of the 16th to the first decades of the 17th century, commercial arithmetic made remarkable progress in England, its subjects centering around "the rule of three" and "the chain-rule (conjoined proportion)". In fact, with this as a social background, R. Record's *The Grounde of Artes* (1540) and W. Oughtred's *Clavis Mathematica* (1631) were published, while J. Napier's *Logarithms* (of which the English edition was published in 1616, dedicated to 'the commercial classes') was so welcome to them.<sup>9</sup> These achievements in the field of mathematics are said to have come from one and the same social conditions, which were also responsible for Graunt's reliance upon his "Shop-Arithmetick". Characterizing mathematics in those days, J. Wallis (1616-1703), who paved the way for Newton's discovery of binominal theorem, wrote as follows: 'Mathematicks at that time, with us, were scarce looked upon as Academical Studies, but rather Mechanical; as the business of Traders, Merchants, Seamen, Carpenters, Surveyors of Lands, or the like, and perhaps some Almanack Makers in London... For the Study of Mathematicks was at that time more cultivated in London than in the Universities'.<sup>10</sup> In such social environments in the days of *manufacture*, Graunt and Petty came into acquaintance with each other, which later developed into a life-long friendship between them, and the latter completed his above-mentioned works in 1640's as will be shown in what follows. From the foregoing, it may be concluded that Graunt's belief in his 'Shop-Arithmetick' was inseparably connected with the rapid progress of commercial arithmetic in those days, which greatly contributed to the development of mathematics in general.

In his *Observations* which consist of 12 chapters, Graunt deals with various matters concerning the movement of population—namely its composition and change by sex, marriage, fertility or the number of 'teeming

<sup>7</sup> *ibid.*, The epistle dedicatory to Sir R. Moray.

<sup>8</sup> 'seine Krämer-rechnung in der Mathematik'. V. John, *Geschichte der Statistik*. Stuttgart, 1884, s. 171.

<sup>9</sup> F. Cajori, *A history of elementary mathematics, with hints on methods of teaching*. Rev. and enl. ed., New York, 1924. See *Modern Times (Arithmetic)*.

<sup>10</sup> E. G. R. Taylor, *The mathematical practitioners of Tudor & Stuart England*. Cambridge, 1954, p. 4.

women', age, the number of males or 'fighting men', religion, profession, parish or location. In so doing, he reduced the 'Bills of Mortality' into 'Tables so as to have a view of the whole together, in order to the more ready comparing of one Year, Season, Parish, or other Division of the City, with another', and discovered 'some Truths, and not commonly believed Opinions' arising from his 'Meditations upon these neglected Papers' (the Bills of Mortality).<sup>11</sup> Among the 'Truths' Graunt finally succeeded in discovering through his extraordinarily persistent observations, the most valuable from the statistical point of view is that concerning numerical regularities in population phenomena. According to Dr. C. H. Hull, these regularities are summarized in the following four points:<sup>12</sup> 1) The constant proportion between some of 'the several casualties' (for instance, 'chronical diseases') and the 'whole number of burials' (Chap. II), 2) the excess of male over female births and the approximate numerical equality of the sexes (Chap. VIII), 3) the high rate of mortality during the earlier years of life (Chap. II), and 4) the excess of the urban over rural death rate (Chap. XII). (The idea of proportion or ratio played the most important role in Graunt's 'Shop-Arithmetick' for the derivation of these regularities. This clearly indicates that Graunt's method was abreast with the progress of commercial arithmetic in his days.) He attributed these regularities to the 'climate and air' or 'the Law of Nature, that is, Law of God', and imagined that the healthfulness of the people was under their control (Chap. II and XII). He concluded that the 'Increase of Mankind' was in conformity with the Law of Nature, because 'Hands being [labour is] the Father, as Lands are the Mother and Womb of Wealth' (Chap. VIII). In connection with these issues, he further discussed such delicate problems as the air contamination and smoke (the increased consumption of 'Sea-Coal'), the relations between professions and deaths, death from hunger and beggary, and asked for the relief of the poor. He also stated that the number of 'christenings' had been decreasing 'disproportionally' since 1642 as a result of the 'Confusion and Changes' in the government, which took place in turn as a result of 'differences in Religion' (Chap. III, XII).

Thus, there is no doubt that the regularity in population phenomena is 'one of the leading ideas in his book', but Graunt failed to realize that 'the regularity must naturally be less prominent where the number of observations is small',<sup>13</sup> though he might have anticipated the Law of Large Numbers. He was however well aware that his 'Observations which I [he] happened to make upon the bills of Mortality, have fallen out to be both Political and Natural'.<sup>14</sup> The author dedicated his book to President Sir

<sup>11</sup> *Observations*. The Preface.

<sup>12</sup> C. H. Hull, *Introduction to The Economic Writings of Sir William Petty*. Vol. I. p. lxxvi.

<sup>13</sup> H. Westergaard, *Contributions to the history of statistics*. London, 1932, pp. 18, 19.

<sup>14</sup> *Observations*. The epistle dedicatory to Sir R. Moray.

R. Moray of the Royal Society which was founded in the year when the book was published. The dedication was made on the ground that his 'Natural, and Political Observations' concerned 'the Air, Countries, Seasons', etc. On the other hand, he dedicated his work to Lord J. Roberts, eminent minister of state under King Charles II, the patron of new science, on the ground that his book was related to political matters, *i.e.* 'Government and Trade'. Moreover, Graunt regarded his *Observations* as 'Natural History'. This was simply because he thought that Bacon reckoned *The History of Life and Death, being the third part of the Instauration Magna* as 'Natural History', and that the Royal Society, the incarnation of Bacon's ideal, was provided with 'the three Estates, viz. the Mathematical, Mechanical, and Physical.'<sup>15</sup>

It is undeniable that Graunt's study, motivated by his personal interest, was too crude in construction to inquire into the true nature of the subject observed and too obscure in basic thinking to clarify the socio-economic relationship. This notwithstanding, his discovery of regularities in social phenomena was of such significance at that time, especially because the regularities were numerically demonstrated with indisputable evidence, that Graunt, shop-keeper as he was, was given the membership of the Royal Society with the King himself as recommender.

But the question presents itself: How did his observations, 'both Political, and Natural' (underlined by the author) come to get unified theoretically by Petty?

### III

In the author's opinion, an important clue for the answer to this question is found in Graunt's writing, *i.e.* in the 'Conclusion' of the *Observations*. The significance of the 'Conclusion', written in very compact style, lies not so much in the fact that it summarizes what has been observed in the preceding 12 chapters as in the fact that it raises new questions, *i.e.* 'To what purpose tends all this laborious bustling and groping? To know, The Number of the People? How many Males, and Females?...' These questions in further analysis are reduced to whether or not, and how, the aforementioned knowledge of the numerical regularities in population phenomena can be used as 'the Art of Governing, and the true Politicks' or 'the Foundation or Elements of this honest harmless Policy...to preserve the Subject in Peace and Plenty.' It is apparent that Graunt considered, 'a clear knowledge of all these particulars,...is necessary, in order to good, certain, and easie Government, and even to balance Parties and Factions both in

<sup>15</sup> *ibid.*; cf. V. John, *op. cit.*, s. 171.



Church and State'. In other words, he intended to obtain scientific knowledge necessary for providing foundations upon which the rational policy for industry and employment of a modern state at its earliest stage could be laid down.

How then can such knowledge be obtained? Graunt proposed for this purpose a survey of 'the Land, and the hands of the Territory', *i.e.* a survey of the 'intrinsick value' and that of the 'accidental, or extrinsick' value of the land. The former means an investigation of a) the topographical features and b) the productivity of land which can be measured in terms of soil fertility and crops available; and the latter concerns the prices of the land and products and their fluctuations. Graunt further urged that these surveys should be combined with a population census by 'Sex, State, Age, Religion, Trade, Rank, or Degree, etc.'<sup>16</sup> Thus, what is proposed in the 'Conclusion' is not only to make a numerical observation of the natural conditions of population, irrespective of the social environments, but to observe the relations between the inhabitants and the land which had the greatest capital value in civil society at that time, and thereby to clarify the socio-economic significance of the population (and its movement).

It must be recalled here that almost the same proposal is made by Petty in the latter half of Chapter V of his *Taxes* ('Of Usury'), namely a survey of the intrinsic and extrinsic or accidental values of lands.<sup>17</sup> In fact, the necessity of the population census is emphasized almost everywhere in Petty's work together with the need of the 'computation' of national wealth. It is needless to repeat details of Petty's arguments on the land survey, for what is said in his work is almost a word by word repetition of *Observations*. But brief mention must be made of the following points:

(1) Proposing a land survey, Petty criticized the Monthly Assessment—a direct tax, which was imposed together with the Excise during the Puritan Revolution. Succeeding the Tudor Subsidies, the Monthly Assessment was created as property tax as a result of the gradual establishment of modern landownership (or in the course of the transformation of rent in kind to money rent) and 'contributed to the break-up of the medieval financial system'.<sup>18</sup> A national tax as it was, it was however not completely deprived of its medieval and local characteristics as might be noted from the fact that its rates widely varied according to localities and its assessment standards were rather obscure. With a view to realizing a fair taxation, the land survey was proposed by Petty as a means to minimize local differences and set up a rational standard for assessment.

(2) Petty's arguments on the land survey are based upon and inseparably connected with his fundamental theories. The 'Ratio formalis' of

<sup>16</sup> All quoted from the 'Conclusion' of the *Observations*. cf. V. John, *op. cit.*, ss. 167-170.

<sup>17</sup> *Taxes*. p. 49, *et seq.*

<sup>18</sup> M. P. Ashley, *Financial and commercial policy under the Cromwellian Protectorate*.

wealth constitutes a keynote of his persistent advocacy of the fairness in taxation, which was so emphatically stressed in the *Taxes*. In fact, it was found by him that, even if taxation should be made at one and the same rate all throughout the country, the effects upon the capitalized value (price) of lands to be brought about by Monthly Assessment would not be the same, dislocating the 'Ratio formalis' of wealth in accordance with the status of the land in question, *i.e.* with the origin of its possession or lease.<sup>19</sup> Inquiring into the 'mysterious nature' of wealth (rents) as a tax source, he further developed the theory of rent (surplus value), land prices and interest and proceeded with the discussion of how to establish a standard for assessment and how to compute the money value of land rent. He finally proposed a survey of lands.

(3) Petty's arguments on land survey, rent, etc. are characterized by some salient methodological features. His usual methodology is as follows: First to observe the subject intrinsically, then to look for the factors which may influence it accidentally or extrinsically, thereby finding its true nature. Take for instance his view on land rent, which constitutes one of the most important parts of his theories: He begins with the study on the intrinsic nature of rent in kind which is followed by the observation of it in the form of money rent. Then, inquiries are made into the factors responsible for the accidental fluctuations of the silver price in order to determine the 'natural Par between Land and Labour'. This is perhaps one of the most typical patterns of the arguments which was employed by Petty. Such an approach is not confined to his discussion on land survey and rent, but common to all his theories.<sup>20</sup> It was through this kind of reasoning that the numerical observations gradually gave rise to more qualitative considerations. It was also through it that social relationships were abstracted from a complex of social phenomena for the formulation of some fundamental ideas and theories of economics.

Petty's proposal for land survey cleared the way for liquidation of the local differences in the feudal rent in kind and nation-wide introduction of the modern land tax system after the Glorious Revolution in England. Some countries on the Continent soon followed suit. Herein lies the practical significance of his theories in human history.<sup>21</sup> Such an achievement

London, 1934, p. 83.

<sup>19</sup> *Taxes*. Chap. IV.

<sup>20</sup> This method of approaching, as aptly mentioned by Dr. Bevan, is shown in the most clear-cut form in Petty's *The Dialogue of Diamonds* (in C. H. Hull's ed. pp. 624-630). cf. W. L. Bevan, *Sir William Petty, a study in English economic literature*. (Publications of the American Economic Association. Vol. IX. No. 4. 1894.) p. 63.

<sup>21</sup> As referred to by Dr. H. Ouchi in his article entitled "Significance of Petty's *Taxes* in the history of economic doctrines" in Japanese *C. Maide Kyōju Kanreki Kinen Ronbunshu* (Papers in Commemoration of Professor C. Maide's 60th Birthday). Tokyo, 1953, pp. 62-63. At the second Protectorate Parliament (1656-57) Major-General E. Whalley, one of the Regi-

of his was made possible, it is to be remembered, only by his laborious efforts to tackle the very central problem put forth by Graunt in the 'Conclusion' of the *Observations*—a comprehensive survey of population in connection with the lands which were then considered to have the greatest capital value in civil society as well as a unitary understanding of 'the Land, and the hands of the Territory'. This being the case, it is necessary for us to clarify what enabled Petty to do so.

Before taking up this problem, the author wishes to make a cursory review on the so-called "Disputed Authorship" of Graunt's *Observations*. He does not however intend to go into details in this respect, but to summarize the controversies about the similarity or rather identity between the 'Conclusion' of the *Observations* and Petty's arguments on land survey in the *Taxes*. In other words, we shall be concerned with the similarity or identity of the so-called "Parallel Passages" with a view to elucidating their social background, for such an elucidation is closely connected with the main subject of this paper.

#### IV

Although Graunt's name is printed on its title-page, which was the actual author of the *Observations*, Graunt or Petty? This question was raised soon after the death of Graunt and has since remained unsolved in the past three centuries or so. We do not want to go into details, much less to get involved in this long-pending controversy, but wish to make a brief survey of the controversial discussions referring to the publications,<sup>22</sup>

cides, criticized the Monthly Assessment and proposed 'a national rate of 6 *d.* in the pound'. But the proposal was rejected on the ground that it was 'plausible but not practicable', because there had not been 'an elaborate survey of the entire property of the kingdom.' (cf. Ashley, *op. cit.*, pp. 74-75.) It can be said that Petty's arguments on land survey and the theory of rent provided a theoretical basis for such a proposal.

<sup>22</sup> In preparing this bibliography, the author owes much to the literatures (27), (43), (44) and (45). Comments contained in some works on the history of statistics and some dictionaries are omitted. As for the literatures marked with asterisks, information is only indirect.

- (1) \* Aubrey, J. (1626-97), *Brief lives*, ed. by A. Clark. Oxford, 1898. 2 vols.
- (2) do, *Brief lives*, ed. by O. L. Dick. London, 1950.
- (3) \* Bell, J. (?-?), *London's remembrancer*. London, 1665.
- (4) \* Burnet, G. (1643-1715), *History of his own time*. 2nd ed. Oxford, 1833. 6 vols.
- (5) Child, Sir J. (1630-99), *A new discourse of trade*. 2nd ed. London, 1694.
- (6) Evelyn, J. (1620-1706), *The diary of John Evelyn*, ed. by W. Bray. London, 1950. 2 vols.
- (7) Hale, Sir M. (1609-76), *The primitive origination of mankind*. London, 1677.
- (8) Halley, E. (1656-1742), *An estimate of the degrees of the mortality of mankind*, ed. by L. J. Reed. Baltimore, 1942.
- (9) \* Houghton, J. (d. 1705), *A collection of letters for the improvement of husbandry and*

the author happened to gain access to directly or indirectly.

It was probably in the middle of the 19th century, when J. R. McCulloch formally recognized Graunt's authorship of the *Observations*,<sup>22-14</sup> starting this protracted controversy. Concerning the authorship of this work, the contemporaries of Graunt differed from one another in opinion,

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- trade. London, 1681-83. 2 vols.
- (10) \* Oldenburg, H. (1615?-77), *Oldenburg to Boyle, 18th September, 1665*. (R. Boyle's Works, ed. by T. Birch. London, 1772. 6 vols.)
  - (11) \* Pett, Sir P. (1630-99), *The happy future state of England*. London, 1688.
  - (12) Süßmilch, J. P. (1707-57), *Die göttliche Ordnung*. Berlin, 1741. Jap. Übers. von I. Takano & T. Morito. Tokyo, 1949.
  - (13) do, *Die göttliche Ordnung*. 2. Aufl. Berlin, 1761-62. 2 Bde.
  - (14) 1845 McCulloch, J. R., *The literature of political economy*. London, 1845.
  - (15) 1851 Roscher, W., *Zur Geschichte des englischen Volkswirtschaftslehre im 16. und 17. Jahrhundert*. Leipzig, 1851. Jap. Übers. von E. Sugimoto. Tokyo, 1929.
  - (16) 1855- Mohl, R. von, *Die Geschichte und Literatur der Staatswissenschaften*. Erlangen, 58 1855-58. 3 Bde.
  - (17) 1859 Hodge, W. B., *On the rate of interest for the use of money in ancient and modern times*. (Assurance Magazine, and Journal of the Institute of Actuaries. Vol. VIII. 1859.)
  - (18) 1859 De Morgan, A., *On a statement revived in Mr. Hodge's paper on interest, with reference to the authorship of Graunt's Observations*. (ibid.)
  - (19) 1865 Todhunter, I., *A history of the mathematical theory of probability from the time of Pascal to that of Laplace*. Cambridge and London, 1865.
  - (20) 1867 Wagner, A., *Statistik*. (Deutsches Staats-Wörterbuch, hrsg. von J. C. Bluntschli und K. Brater. 11. Bde. Stuttgart und Leipzig, 1857-70. 10. Bd. Jap. Übers. von H. Ouchi. Tokyo, 1942.)
  - (21) 1872 \* De Morgan, A., *A budget of paradoxes*. London, 1872.
  - (22) 1892 Cunningham, W., *The growth of English industry and commerce in modern times*. Cambridge, 1890-92. 2 vols. Vol. II.
  - (23) 1894 Bevan, W. L., *Sir William Petty, a study in English economic literature*. (Publications of the American Economic Association. Vol. IX. No. 4. 1894.)
  - (24) 1895 Higgs, H., *Review of Bevan's Petty*. (Economic Journal. Vol. V. 1895.)
  - (25) 1895 Fitzmaurice, E., *The life of Sir William Petty 1623-1687*. London, 1895.
  - (26) 1896 Hull, C. H., *Graunt or Petty? The authorship of the Natural and Political Observations upon the Bills of Mortality*. (Political Science Quarterly. Vol. XI. 1895.)
  - (27) 1899 do, *The authorship of the Natural and Political Observations upon the Bills of Mortality*. (The Economic Writings of Sir William Petty, ed. by C. H. Hull. Cambridge, 1899. 2 vols. Vol. I.)
  - (28) 1903 Pasquier, M., *Sir William Petty, ses idées économiques*. Paris, 1903.
  - (29) 1927 Lansdowne, Marquis of, *On the disputed authorship of the London Bills of Mortality. Parallel passages in the London Observations and Petty's unpublished writings. (The Petty Papers, ed. by the Marquis of Lansdowne. London, 1927. 2 vols. Vol. II.)*
  - (30) 1928 Westergaard, H. and Nymbole, H. C., *Grundzüge der Theorie der Statistik*. 2. Aufl. Jena, 1928.
  - (31) 1928 Lansdowne, Marquis of, *The disputed authorship. (The Petty-Southwell Correspondence, 1676-1687, ed. by the Marquis of Lansdowne. London, 1928.)*
  - (32) 1928 Greenwood, M., *Graunt and Petty*. (Journal of the Royal Statistical Society. Vol. 91. 1928.)
  - (33) 1931 Bonar, J., *Theories of population from Raleigh to Arthur Young*. London, 1931.)



because they recognized facts differently. Most of them were however interested in standing neither for Graunt nor for Petty. It was the commentators of later generations that tried to utilize the unbiased testimonies of these contemporaries for determining the authorship. There can be no doubt that almost all the contemporaries hailed with joy the brilliant "discovery" on the numerical regularities reported in the *Observations* and tried to develop various achievements in it for their own use.<sup>22-5,7,8</sup> J. P. Süßmilch (1706-67), who endeavoured to develop the Political Arithmetic thus founded in England as 'die politische Rechen-kunst', evaluated Graunt's work so highly that he compared his achievements with the discovery of the New Continent by Columbus.<sup>22-12,13</sup> But he regarded the regularities discovered by Graunt as 'die göttliche Ordnung' and Petty's computation of national wealth simply as a technical method of statistical estimation. He probably failed to recognize the significance of "political" (social) way of thinking initiated by these two pioneers,<sup>23</sup> so far as the 1741 edition of his work was concerned.

Dr. C. H. Hull presents a comprehensive and detailed survey on all the "Disputed Authorship" controversies in the latter half of the 19th century.<sup>22-26,27</sup> Two salient features of the controversies in this period deserve special attention: namely, 1) it was almost agreed that the *Observations* were a joint work of Graunt and Petty in some sense or other, and 2) controversies were gradually concentrated on the character of their collaboration, i.e. which played a more essential role, Graunt or Petty. In

(34) 1932 Müller, W., *Sir William Petty als politischer Arithmetiker. Eine soziologisch-statistische Studie.* Gelnhausen, 1932.

(35) 1932 Lansdowne, Marquis of, *Petty and Graunt.* (*Times Literary Supplement*, 8th September 1932. No. 1597.)

(36) 1932 Brett-James, N. G., *Petty and Graunt.* (*ibid.*, 15th September 1932. No. 1598.)

(37) 1932 Greenwood, M., *Graunt and Petty.* (*ibid.*, 22nd September 1932. No. 1599.)

(38) 1932 Lansdowne, Marquis of, *Petty and Graunt.* (*ibid.*, 13th October 1932. No. 1602.)

(39) 1932 Powell, L. F., *Petty and Graunt* (*ibid.*, 20th October 1932. No. 1603.)

(40) 1933 Greenwood, M., *Graunt and Petty—A re-statement.* (*Journal of the Royal Statistical Society.* Vol. 96. 1933.)

(41) 1937 Clark, G. N., *Science and social welfare in the age of Newton.* Oxford, 1937.

(42) 1937 Willcox W. F., *The founder of statistics.* (*Revue de l'Institut International de Statistique.* 5 ann. livr. 4. 1937.)

(43) 1939 Willcox, W. F., *Introduction to the reprint of J. Graunt's Observations.* Baltimore, 1939.

(44) 1941 Kuruma, S., *On the disputed authorship of J. Graunt's Observations.* (Jap. transl. of J. Graunt's *Observations.* Tokyo, 1941.)

(45) 1948 Greenwood, M., *Medical statistics from Graunt to Farr.* Cambridge, 1948.

(46) 1954 Strauss, E., *Sir William Petty, portrait of a genius.* London, 1954.

<sup>23</sup> In this sense, Süßmilch was in the history of statistics the first man who systematized Political Arithmetic. cf. V. John, *Johann Peter Süßmilch.* (*Allgemeine Deutsche Biographie.* Leipzig, 1894. 37. Bd. s.195.) D. Diderot had no doubt about authorship of Graunt. cf. Article "Arithmétique Politique" in *L'Encyclopédie.* Tome II. Paris, 1751. J. G. Meusel, of the *Staatenkunde*, also believes that the *Observations* were Graunt's work. cf. *Literatur der Statistik.* Leipzig, 1790. s. 22.

defence of their own stands, all the controversialists resorted to "direct testimony" and/or "inward evidence" as Dr. Hull put it. Arguments based on the latter can further be classified into the following: a) Picking up and analyzing the "Parallel Passages" in the works of the two pioneers, b) comparing the statistical methods expounded in their works, and c) comparing their character, styles of writing, etc. After having studied in detail all the controversies along these lines, Dr. Hull concludes, 'in short, the "Observations upon the Bills of Mortality of London" are essentially Graunt's work, and he deserves the credit for them'.<sup>22-27</sup> By using the adverb "essentially", Dr. Hull undoubtedly refers to the numerical regularities discovered by Graunt.

In the 20th century, Dr. Hull's conclusion had been regarded, as before, as an established fact until the twenties when the Marquis of Lansdowne, a descendant of Petty, edited and published *The Petty Papers* and *The Petty-Southwell Correspondence* and concluded, 'there can, I think, be no reasonable doubt that the Observations on the London Bills were in all essential respects his [Petty's] own work'.<sup>22-29</sup> The "essential respects" as said by the Marquis of Lansdowne may be summarized as follows: 'Graunt's hand may perhaps have held the pen, but it was surely Petty who supplied the ideas which have caused this book to be regarded as "One of the Classics of Statistical Science"'.<sup>22-31</sup> A renewed and hotter controversy thus took place between the descendant of Petty and Prof. M. Greenwood.<sup>24</sup> Other commentators took part in the controversies, which proceeded in this century along the same line as that a few decades ago. It however deserves special mention that the academic discussions became concentrated increasingly upon which should be regarded as more "essential", Graunt's or Petty's ideas in the *Observations* (a line of demarcation had gradually be drawn between their ideas). Prof. W. F. Willcox fundamentally agrees with Dr. Hull and offers a very persuasive conclusion.<sup>22-43</sup> According to him, a) The Epistle Dedicatory to Sir R. Moray, b) the 'Conclusion,' and c) the Life Table (Chap. XI) may have been written by Petty, but the whole of the *Observations* except a) and b) is 'a more coherent and sinewy piece of writing'.<sup>25</sup>

This is a very cursory review of the "Disputed Authorship" controversies up to the Second World War. Since the end of the War, there has not been repeated any such argument so far as the author is concerned. In his recent work on Petty,<sup>22-46</sup> Mr. E. Strauss however made an excellent

<sup>24</sup> Prof. G. N. Clark wholly agrees with Prof. Greenwood who asserts that the statistical achievements in the *Observations* were attained entirely by Graunt, but he says that Prof. Greenwood is 'unnecessarily emotional' in his argument. 22-41.

<sup>25</sup> Prof. Greenwood, who attributes the authorship of the Life Table to Graunt, considers as 'cogent' what is contended by Prof. Willcox, but he says, 'although Prof. Willcox has certainly shaken my previous conviction, I still feel reluctant to surrender Graunt's table to Petty.' 22-45.

review on this issue. Saying 'the posthumous reputation of the *Observations*' lies in 'its painstaking statistical method', he carefully traces Petty's substantial contributions in this respect in a lot of contemporary literature. He concludes that 'the co-operation between Petty and Graunt, which resulted in the *Observations*, was an epoch-making event for the history of statistics', and that the 'Conclusion' of the *Observations* [which, in his opinion, was 'almost certainly Petty's work'] sums up the 'aims of Petty's pioneer work in the social sciences, which consisted in the proclamation of quantitative measurement as the key to adequate knowledge of social facts, and in the principle of inductive reasoning from statistical data'.

The prolonged controversies extended over more than a century from the perfection of classical economics and modern statistics, respectively, by D. Ricardo and L. A. J. Quetelet in the first decades of the 19th century to the Second World War—during this period both sciences underwent a series of remarkable developments and transformations. These discussions, in the author's opinion, are not without the following shortcomings: namely, 1) too much emphasis has been placed on the numerical regularities in social happenings, which has been derived by Graunt from the 'natural and political' observations, 2) the explanation of the social and economic facts, measured and perceived numerically, have often been ignored as originating from Petty, and 3) the issue of the "Parallel Passages", including the similarity between the 'Conclusion' of the *Observations* and Petty's arguments on a land survey,<sup>26</sup> has been discussed merely as a problem of parallelism in their published works. Such discussions are liable to distort the real value of the *Observations*. As properly said by Prof. S. Kuruma, the final solution of the authorship dispute may depend upon the difference of opinions about wherein the true value of the *Observations* lies.<sup>22-44</sup> The essential point here is not the clarification of the sole or co-authorship of the *Observations*, but the analysis on the social basis of the "Parallel Passages", which induced the dispute, while the land survey and the distribution of confiscated lands carried out by Petty himself in Ireland under the Commonwealth prior to the publication of the *Observations* and the *Taxes*, were among the most important constituents of the said social basis.

<sup>26</sup> In Dr. Hull's opinion, the parallels here are the 'longest and closest' among the Parallel Passages and 'are doubtless important.' He further writes that the 'Conclusion' is not 'a sober summary in the style of the book itself' but 'a not altogether unsuccessful attempt to write wittily about these matters'. 22-27. The author wishes to note that the words 'to write wittily about these matters' are cynically quoted by Dr. Hull from the 'Conclusion' probably in the sense that Petty himself is making witty remarks in the 'Conclusion' instead of 'truly' studying 'Nature and Things' (1st ed. of the *Observations*). But the author does not agree with Dr. Hull in this respect.



## V

The land survey and the distribution of confiscated lands were directly connected with the conquest of Ireland by Cromwell, better known as the Cromwellian Settlement of Ireland. The conquest and confiscation were an event in a series of England's invasions of Ireland, which was started in the 12th century and strengthened by the absolutist policy to Ireland by Henry VII, Queen Mary and Queen Elizabeth I, as well as by later attempts to completely subdue her. It was called 'the most sweeping, perhaps, [confiscation] that modern ages have seen'<sup>27</sup> and 'the climax of a century of English policy'.<sup>28</sup> And its epochal significance lies not so much in the thoroughness with which it was enforced mercilessly as in its ultimate objective, *i.e.* the establishment of civil order in Ireland.<sup>29</sup>

It took more than a decade after 1641 for the English Commonwealth to suppress a series of rebellions by the Irish, especially by the Roman Catholic landlords against the colonial domination by England. The main aim of this English policy was none other than to create, according to a predetermined plan, a modern land system through the distribution of confiscated lands among the English Protestants—Protestant yeomanry in Ireland.<sup>30</sup> It must be remarked here that the lands thus confiscated were distributed as redemption, in the form of land, of government debts to the creditors, namely the English Protestants— a) the London Adventurers who supplied war funds to the Government for 'the speedy and effectual reducing of the rebels in Ireland'<sup>31</sup> and b) the officers and soldiers of the Cromwellian army whose remunerations in arrears were to be covered by the distribution of rebels' lands. A study of the debentures issued by the Government for the army officers and men reveals that the money debts were redeemed not only in the form of 'Rebels Lands' but also (rebels') 'Houses, Tenements and Hereditaments, in Ireland; or other Lands, Houses, Tenements, and Hereditaments there'. It means that the material wealth of Ireland was offered entirely as a security for the monetary loans of the Commonwealth Government of England. 'Ireland,' said E. Hyde, the Earl of Clarendon (1609-74), 'was the great capital out of which all debts were paid, all services rewarded, and all acts of bounty performed'.<sup>32</sup>

For good or bad, what the Commonwealth had to enforce by all

<sup>27</sup> W. F. T. Butler, *Confiscation in Irish history*. London, 1917. p. 115.

<sup>28</sup> E. Strauss, *Sir William Petty, portrait of a genius*. London, 1954. p. 66.

<sup>29</sup> C. Hill and E. Dell (Editors), *The good old cause*. London, 1949. p. 429.

<sup>30</sup> C. H. Firth, *Cromwell's army*. 2nd ed. London, 1912. p. 205.

<sup>31</sup> E. Curtis and R. B. McDowell (Editors), *Irish historical documents 1172-1922*. London, 1943. pp. 177-179. This act is generally called the Act of Subscription (1641).

<sup>32</sup> A Cromwellian Debenture, reproduced in J. P. Pendergast, *The Cromwellian settlement of Ireland*. 2nd ed. Dublin, 1875. Frontispiece. R. Bagwell, *Ireland under the Stuarts and during the Interregnum*. London, 1909-16. 3 vols. Vol. II. p. 338.



means was: 1) To calculate the total amounts of debts due to a large number of various creditors, 2) to make a survey of the confiscated lands which constituted the most important means to redeem these debts, and 3) to carry out the redemption of debts, *i.e.* the distribution of lands among the creditors.<sup>33</sup> It was the second and third items that Petty was ordered by the Government to take charge of. Petty, being originally in charge of the land survey, was naturally entrusted with the distribution of the surveyed lands.<sup>34</sup>

It was in September, 1652, or immediately after the suppression of the Irish rebels that Petty left the post of professor of anatomy at Oxford University and came to the 'wasted, desolate country'<sup>35</sup> as a physician to Cromwell's army. Not long after his arrival in Ireland, he took over the task of surveying and distributing the confiscated lands, though it had little connection with his profession. We know many reasons for his taking over such a duty, but two of them deserve special consideration: 1) He thought 'the whole work would have been over...in about two years time, so as to have proved rather an unbending than a breaking of that bow, wherein I [Petty] aimed at natural knowledges', and 2) he wanted to enlarge his 'trade of experiments from bodies to minds, from the motions of the one, to the manners of the other, thereby to have understood passions as well as fermentations...'<sup>36</sup>

Petty's land survey was called the Down Survey in the sense that the lands surveyed were laid down on maps. Working under his direction were about 1,000 surveyors, mostly soldiers. It is more significant that he adopted the principle of division of labour not only for field work but for the making of surveying instruments as well.<sup>37</sup> Thus, the Down Survey, covering the 22 counties of the country, was finished in 13 months.<sup>38</sup> The methods employed and the survey itself are described in detail in his *History of the Down Survey*. So far as the topographical features covered in the

<sup>33</sup> M. J. Bonn, *Die englische Kolonisation in Ireland*. Stuttgart und Berlin, 1906. 2 Bde. II. Bd. s.74.

<sup>34</sup> *ibid.*, s.83.

<sup>35</sup> R. Dunlop (Editor), *Ireland under the Commonwealth*. Manchester, 1913. 2 vols. Vol. II. p. 477. It is written that due to a series of rebellions, about 'five-sixths of her people had perished' in Ireland. *cf.* J. P. Prendergast, *op. cit.*, p. 307.

<sup>36</sup> *Reflections upon some persons and things in Ireland*. 2nd ed. Dublin, 1790. pp. 3, 7. In his address delivered on November 24, 1658, at the Grocers' Hall, Petty declared that 'the chief end of my going to Ireland was to make way for distinguishing the soldiers' from the adventurers' interest in the eleven counties'. These remarks indicate that, even before his departure for Ireland, he had been determined to take over the task of land surveying and distribution there. *cf.* *Calendar of the State Papers, Ireland, Adventurers for land, 1642-1659*. p. 362.

<sup>37</sup> Sir T. A. Larcom writes that Petty 'had discovered the great principle of division of labour' in the course of the Down Survey. *The history of the Down Survey*. p. 314.; *cf. ibid.*, pp. xiv-xv, 17-18.

<sup>38</sup> *ibid.*, p. 295.

survey are concerned, the 'Instructions'<sup>39</sup> Petty gave to his subordinate surveyors are said to have been summarized almost literally in a 'survey of intrinsick values of land' in the *Taxes* (Chap. V). In fact, the Down Survey was originally intended for the following two-fold purposes, *i. e.* cadastral as well as topographical surveying, for the survey was planned as a prerequisite for the proposed distribution of the confiscated lands and, moreover, quit-rent and other taxes were to be imposed upon the lands which would be distributed among the creditors. The essential point of technical difficulties of the Down Survey therefore lay in the classification of the distributed lands in accordance with the degree of their profitability. A surveyor, called Lewis Smith, being engaged in the land survey in the county of Kerry, complained, 'as to what wee have done in Kerrey, wee can very well justifie quantities, but as for the quality of land wee had noe rule to walke by,... but did according to the best of our judgements, and the best information wee could get'.<sup>40</sup> This should not be taken as a testimony by a single incompetent surveyor but interpreted as indicating the general situation about 'the almost impossibility of distinguishing the classes of land in the state they then were'.<sup>41</sup>

This difficult problem was "solved" by the methods employed 'ordinarily and usually' in accordance with 'the advice of the chief inhabitants'<sup>42</sup> in each county. In Petty's arguments on land survey as expounded in the *Taxes* (Chap. V) however the issue is rationally solved by an investigation of each denomination of land which is measured intrinsically by fertility and available crops. This will become clearer if we read his essay<sup>43</sup> on (Irish) land registry written just before the publication of the *Taxes*. In that essay, Petty proposes a survey of 'the intrinsick fertility' as a means to measure the value of land. It is highly significant that this sort of approaching corresponds to the typical method of observing the subject "intrinsically", which was also employed in his studies on rent (and other fundamental theories).

## VI

It was during 1656-58 that the distribution of the forfeited lands was enforced under Petty's supervision, and this under ever-worsening conditions, such as the increasing disbandment of the army forces, the impoverishment of the disbanded soldiers and the subsequent negotiation of debentures, the

<sup>39</sup> *ibid.*, pp. 46-53.

<sup>40</sup> *ibid.*, p. 97.

<sup>41</sup> *ibid.*, p. 330.

<sup>42</sup> *ibid.*, p. 96.

<sup>43</sup> Refer to the 10th literature listed on page 55.

increasing concentration of such debentures in the hands of high-ranking officers and politicians, the friction between the army and the London Adventurers, and so forth. These conditions are summarized by Sir T. A. Larcom as follows: 'In truth it is difficult to imagine a work more full of perplexity and uncertainty than to locate 32,000 officers, and soldiers, and followers, with adventurers, settlers, and creditors of every kind and class, having different and uncertain claims on lands of different and uncertain value, in detached parcels sprinkled over two-thirds of the surface of Ireland'.<sup>44</sup> Land prices in Ireland were roughly fixed province by province under the Act of Subscription of 1641, and they were called 'Act Rates'. For surveying and distributing the confiscated lands, it was however necessary to estimate the prices lot by lot in full consideration of the natural, economic and social conditions of each lot—a very complicated and difficult task in an extremely backward country like Ireland under the afore-mentioned conditions.

It 'would require a treatise by it self', as Petty wrote, to describe perfectly the distribution of the forfeited lands. In carrying out this laborious project, Petty regarded 'the whole party [of the creditors (soldiers)] as one man...as if one uniform distribution had been made, and then considered each as having received or being about to receive such or such a "quota pars", in order to make up the deficient, and pare down the redundant, to the same rate in the pound on their respective claims.' 'In this there were of course many practical difficulties',<sup>45</sup> and this distribution was carried out forcibly 'as Parties interested could prevail upon and against one another by their Attendance, Friends, Eloquence, and Vehemence; for what other Foundation of Truth it had in nature, I [Petty] know not'.<sup>46</sup>

All these things came from the very fact that, in such a backward country as Ireland where money was regarded as "useless" for most of the inhabitants,<sup>47</sup> it was highly difficult to compute the money rent or land

<sup>44</sup> *The history of the Down Survey.* p. 338.

<sup>45</sup> *ibid.*, pp. 184, 336.

According to Mr. A. T. Lucas' private communication Petty's description about land-distribution (*cf. ibid.*, p. 184, 2nd paragraph) is interpreted as follows:

'In order to give an account of the distribution of the forfeited lands, it has first to be noted that when some of the soldiers were disbanded in 1653 they were given lands at a more advantageous valuation than that set out in the Act: the valuation adopted was apparently the same for all of them. In order therefore to determine how much they actually received, as compared with what they were entitled to, the amount of land to be distributed to all the soldiers must be computed at the rates set out in the Act; then a calculation must be made of the proportion which the amount of land that the disbanded men received (whether this was supposed to be  $\frac{5}{8}$  or  $\frac{2}{3}$  or any other fraction of their whole share) bore to the amount that they should have received. The reckoning must not be on the basis that those who got lands in Louth have received half of what is due to them, and that those in Longford have got the whole, etc.'

<sup>46</sup> *The Political Anatomy of Ireland.* p. 179.

<sup>47</sup> *ibid.*, Chap. XI; *Political Arithmetick.* Chap. II.

price in full consideration of all the "extrinsic or accidental" factors. In other words, the greatest difficulty involved in the Down Survey lay in distinguishing the profitability from the unprofitability of lands. In the case of land distribution, nothing was more difficult than to express in terms of money the distinguished, if not perfectly, profitability or unprofitability. This was the reason why Petty interpreted his "survey of extrinsic or accidental values of lands" as a method of computing the money rent through a survey of prices (and price fluctuations) of land products. Not only that, this method of computation, as already mentioned, corresponds to the method with which Petty studied the land rent in kind in the form of money rent. In the course of such analysis, Petty lay 'the foundation of equalizing and balancing of values' of commodities, upon which 'the superstructures' (*i.e.* extrinsic or accidental price fluctuations) are built (*Taxes*. Chap. IV). Furthermore, starting from this foundation thus laid down, he came to consider all the commodities as 'the creatures of Lands and mens Labour thereupon', and tried to find out the 'natural Par between land and labour' in order to 'express the value by either of them [land and labour] alone'. He further determined, though in very simple form, the 'Natural Price' (value of commodities) underlying the price fluctuations.

Probably comparable in scale to the Domesday Survey, the Down Survey (including the distribution of the confiscated lands) could not have been carried out without the strong state power of the Commonwealth which completely suppressed the Irish rebellion. However, its ultimate aim, *i.e.* the establishment of the English Protestant yeomanry in Ireland, was not attained in its perfect form. In reality, it induced the mushrooming of the 'Cromwellian newcomers' or 'upstart gentry'<sup>48</sup> and helped to promote the colonial pauperization of Ireland, in particular, after the Glorious Revolution, thereby laying the foundation upon which English absenteeism was gradually built.<sup>49</sup> This notwithstanding, it is notable that this survey paved the way for the establishment of a modern land system in Ireland which was little more than 'a new State' ('as a white paper'), and this 'before men had even the possession of any land at all'<sup>50</sup> there. In this sense, the survey substantially succeeded in attaining its objective. The reason why Petty's arguments on land survey played an epochal role for the creation of

<sup>48</sup> E. MacLysaght, *Irish Life in the seventeenth century*. 2nd ed. Oxford, 1950, Chap. IV. Petty was himself one of these get-rich-quick upstarts, for he made speculative purchases of the debentures and got possession of a wide expanse of lands in Ireland. On the occasion of the Restoration however these lands were granted to him due to the favour of King Charles II. *cf.* C. S. P. Ireland, 1660-62. pp. 180, 280, 502-3. In this respect, his complicated personality is shown in relief. *cf.* E. Strauss, *op. cit.*, Part II.

<sup>49</sup> 'As a transfer of property from Irish to English hands the Cromwellian settlement had some measure of success, but as a scheme of colonisation it totally failed.' R. Bagwell, *op. cit.*, Vol. II. p. 337.

<sup>50</sup> *Taxes*. pp. 9, 39.



a modern land tax should be looked for in the very fact that his Down Survey was itself a monumental project for introducing this system.<sup>51</sup>

In England, the art of surveying, cartography and map-making made remarkable progress in and after the latter half of the 16th century as a result of 'a convergence of economic needs and intellectual progress', as well as of the gradual decline of feudal landownership, for 'there was a need [for] the defining of rights'.<sup>52</sup> Indeed, field-surveying was 'very much needed during a period of forfeited estates', inducing W. Leybourne to write his *Compleat Surveyor* (1653).<sup>53</sup> Petty's Down Survey is said to have been 'the most comprehensive and scientific survey of a large area made by any Englishman before 1755'.<sup>54</sup> Its accuracy was such that it only 'understated the area of forfeited land by 10-15 percent',<sup>55</sup> and his *Hiberniac Delineatio* (1685?), or 'the first atlas of Ireland', was 'the most important event in the 17th century'<sup>56</sup> in that 'Ireland has for the first time found her true shape, if not real size'.<sup>57</sup>

Modern cartography was 'in all its aspects closely allied to statistics... [for] a map is an abstract statement based on measurement; statistics are abstract statements based on measurement, counting, and calculation'.<sup>58</sup> As mentioned elsewhere, Petty's Down Survey was itself at the same time a land survey, a project for map-making and a statistical investigation of the 'Lands, Houses, Tenements and Hereditaments in Ireland' which constituted the whole national wealth of that country. In this sense, historical progress of surveying, cartography and statistics is clearly reflected in the Down Survey.

It is almost certain that, in addition to the Down Survey, Petty took charge of a population census in Ireland in the latter period of the Commonwealth.<sup>59</sup> The returns of this census are very comprehensive, being 'arranged geographically in counties, baronies, parishes, and townlands; and in cities, parishes and streets. In addition to mere numbers, the returns supply the names of the principal or distinguished occupiers of townlands and streets...In setting down the numbers on each inhabited townland and

<sup>51</sup> England at that time, though urgently needed, had no Land Registry. cf. D. Ogg, *England in the reign of Charles II.* Oxford, 1934. 2 vols. Vol. II, p. 441, and M. F. Ashley, *op. cit.*, p. 75. When one reads the 10th literature on page 55 with this in view, he could understand all the more vividly Petty's far-sighted arguments.

<sup>52</sup> G. N. Clark, *op. cit.*, p. 125.

<sup>53</sup> E. G. R. Taylor, *op. cit.*, pp. 86, 230-231, 360.

<sup>54</sup> E. Lynam, *British maps and map-makers.* Rev. ed. London, 1947. p. 33.

<sup>55</sup> Y. M. Goblet's work cited by E. Strauss, *op. cit.*, p. 71.

<sup>56</sup> R. V. Tooley, *Maps and map-makers.* 2nd ed. London, 1952. p. 93.

<sup>57</sup> Y. M. Goblet's work referred to in E. Strauss, *op. cit.*, p. 73.

<sup>58</sup> G. N. Clark, *op. cit.*, p. 126.

<sup>59</sup> S. Pender (Editor), *A census of Ireland, circa 1659.* Dublin, 1938. Introduction. This voluminous book is undoubtedly one of the best works which provides us with valuable information about the history of modern population censuses.

in each street, the proportions of English, Irish, and Scotch, are expressed ...The returns also supply important and interesting baronial and city lists of the names and numbers of principal Irish.'<sup>60</sup> The most significant fact was that this census was conducted along the lines of the Commonwealth Government's fundamental policy toward Ireland.

The Down Survey, together with this census, can be said to have been the first statistical surveys of 'the Land, and the hands of the Territory' in modern history. It is none the less noteworthy that these projects gave important stimulus to the theoretical development from Graunt to Petty.

## VII

In the latter part of his boyhood Petty received an education of medieval style, probably based on the Seven Liberal Arts, at a Jesuit college at Caen, France.<sup>61</sup> In the early years of his adolescence, he experienced the Puritan Revolution and 'vigorously followed' his studies of medicine (anatomy) and mathematics at then most advanced universities in Holland. It was at Dutch universities and at the informal gathering at Paris with M. Mersenne as a central figure that he was influenced directly or indirectly by then leading scholars and thinkers, such as J. Pell, T. Hobbes, S. Hartlib, J. A. Comenius, R. Descartes, B. Pascal, and P. Gassendi. At Paris, he, together with Hobbes, was absorbed in reading A. Vesalius' *Fabrica* (1543). It was after the latter half of his adolescence that his command of strikingly comprehensive knowledge thus obtained, partially in response to the practical needs characteristic of the science and technique in the days of *manufacture*, was further developed mainly through his intimate association with the "virtuosi", who were the followers of Bacon and his experimental philosophy. And it was in those days that he became a good friend of Graunt (as we have already seen in the 2nd section of this paper).

Generally speaking, it can be said that, when he took charge of the Down Survey, Petty was one of the learned men with the widest knowledge and highest education known at his time. In fact he was one of the 'practitioners'<sup>62</sup> under the direct influence of Bacon. Not only that, he was a mathematician and anatomist, who knows the secret of success in life. Though limited space prohibits a detailed explanation in this respect, his papers written in 1640's (see the first five works listed on page 55) clearly indicate that already at that time he knew the importance of numerical

<sup>60</sup> W. H. Hardinge's statements cited by Mr. S. Pender. *ibid.*, pp. v-vi.

<sup>61</sup> cf. *Palinodia* and *A Collection of W. Petty's Severall Works and Writings since the Year 1636 in The Petty Papers*. No. 149, 158.

<sup>62</sup> It is necessary for us to recall here the remarks of J. Wallis shown on page 55 (see Footnote 10). Also refer to E. Strauss, *op. cit.*, p. 184.

observation of socio-economic phenomena and practised them.

As already mentioned, he took care of the laborious task of the Down Survey in order to extend his 'trade of experiments' from natural history to sociology. It is not an exaggeration to say that in this connection he closely followed Bacon's 'striking recommendation'<sup>63</sup> as shown in the following sentence of his: 'It may also be asked (in the way of doubt rather than objection) whether I speak of natural history only, or whether I mean that the other sciences, logic, ethics, and politics, should be carried on by this method. Now I certainly mean what I have said to be understood of them all'.<sup>64</sup> After all, the Down Survey was historically a great social experiment not only for the Commonwealth of England but also for Petty himself. So far as the fundamentals of his theory and methodology are concerned, it was mainly through this experiment that Petty initiated the labour theory of value, analyzed the social setup centering around the creation of wealth, and estimate national wealth from the unitary point of view in the *Taxes* and the *Verbum Sapienti*, which were written after the Restoration and thereby greatly contributed to the solution of the problem as set forth in the 'Conclusion' of Graunt's *Observations*. In other words, it was basically through the Down Survey that Petty's anatomy and arithmetic, combined with Graunt's commercial arithmetic and guided by Bacon's experimental philosophy, crystallized into a "political" (social in the modern sense of the term) entity.

In the foregoing six sections, we have seen how Political Arithmetic and Political Anatomy, which Petty 'long aimed at' and 'attempted',<sup>65</sup> were born and grown up to a quantitative method of social science. It was in the Preface to his work entitled 'Political Arithmetick' written during 1671-76 that he first formulated this method with confidence. But the author wishes to emphasize that Political Arithmetic and Political Anatomy constituted the integral parts with each other in his theory under the influence of Baconian philosophy.<sup>66</sup> Salient features of these methods, if regarded as one entity, may be summarized in the following three points:

1) Petty's method is based upon the parallelism between the 'Body Natural' and the 'Body Politick'.

2) It measures and anatomizes the 'Symmetry, Fabrick, and Proportion', namely the structure of civil society by means of 'Number, Weight, or Measure', which are probably originating from *The Wisdom of Solomon*.<sup>67</sup>

<sup>63</sup> B. Farrington, *Francis Bacon, philosopher of industrial science*. London, 1951. p. 113.

<sup>64</sup> F. Bacon, *The new organon*. (*The works of Francis Bacon*. Vol. IV. London, 1883.) p. 112.

<sup>65</sup> *Political Arithmetick*. p. 244. *The Political Anatomy of Ireland*. p. 129.

<sup>66</sup> Petty himself believed in the integrity of his Arithmetic and Anatomy. cf. E. Fitzmaurice, *The Life of Sir William Petty 1623-1687*. London, 1895. p. 158.

<sup>67</sup> G. N. Clark, *op. cit.*, pp. 72-73. G. N. Clark, *The seventeenth century*. 2nd ed. Oxford, 1950. p. 257. E. Strauss, *op. cit.*, p. 185.

3) It severely criticizes the traditional scholastic method of medieval learning and considers 'only such Causes, as have visible Foundations in Nature', *i.e.* factors founded upon the objective facts independent from human consciousness.

What then was the ultimate aim of such a scientific method? It was, as Petty himself clearly writes, 'to shew the uses of knowing the true State of the People, Land, Stock, Trade, etc'.<sup>68</sup> In Petty's theory, 'People' are the bearer of labour power or a source of wealth (value), while 'Land', etc. are the forms of material wealth or the means to acquire it. Accordingly, Petty's method, though closely connected with the demands on the part of the mercantile policy in those days, was intended for grasping of the true nature of wealth in civil society, although he did not make an inquiry into the "Wealth of Nations" so clearly as A. Smith consciously did. It was this theoretical standpoint that enabled Petty to properly evaluate the quantitative regularities, which Graunt derived from the movements of 'People' (population) without referring to 'Land, Stock, Trade, etc.', leading him to the discovery of the qualitative regularities underlying socio-economic phenomena.

In this light, the author wishes to review in the next section the quantitative observations of socio-economic phenomena, which is the most important feature of Political Arithmetic and Political Anatomy, as well as its interconnection with the qualitative side of socio-economic relationships.

## VIII

It is essential that the process of Petty's concept formation was much dependent upon his numerical observations and reasoning based upon them. Their close mutual interconnection is well seen in this dependence. In order to clarify such interconnection, it is necessary to explain what the 'Number, Weight, or Measure', or figures, really were and how they were used by Petty.

In the author's opinion, the figures used by Petty are classified into the following: 1) Figures empirically obtained through statistical surveys or personal observations, 2) figures estimated in some way or other, and 3) illustrative figures used 'as Suppositions to shew the way to that knowledge I [Petty] aim at'. These three kinds of figures, needless to say, are mutually interwoven with one another. It must be noted here that among the first named figures, those obtained through statistical surveys are very few, while those obtained through practical observations are extremely numerous.

<sup>68</sup> *Political Arithmetick.* p. 313.



As for the estimated figures or the second class, the following question arises: How are they estimated? Roughly speaking, they are estimated by three methods: *i.e.* a) estimation which is obtained from known figures or quantities taking into consideration other relevant and concrete facts (by way of the Rule of Three), b) estimation through the application of figures to theoretical reasoning, and c) estimation on the basis of mean values of known figures. Space does not allow us to go into details of these estimations, but as is clear from the ultimate aim of Political Arithmetic, it must be remembered, Petty was primarily concerned with the estimation of national wealth and income, and in making these estimates, he regarded the price (value) of land (and other property as well) as the rent capitalized through 'years purchase', which was equal in function to the general rate of interest.

The typical use of the illustrative figures is seen in Petty's basic theories on rent, interest, etc. As Dr. W. L. Bevan aptly writes, 'when he [Petty] asserts that the price of silver in Russia and in Peru is determined simply by the quantity of labor, it is almost certain that he confidently uses this illustration, without investigating its truth'. He goes on to say that 'his employment of deductive method is concerned in reducing complex facts to simplicity.'<sup>69</sup> It deserves special attention that the figures used as illustrations in such a case play a very important role.

It may be no exaggeration to say that Petty's arguments are all based upon the free use of these three kinds of figures. Theoretically speaking, it is particularly significant that these figures are used simply as a tool of reasoning. These figures now function not only as recorders but also as calculators. But it was only in the early years of the modern age that the medieval practice of using the Roman figures for recording and using the abacus for calculation was replaced by the new method of using the Indo-Arabian figures for both purposes. Prof. F. Cajori calls the former the abacistic school, and the latter the algoristic school.<sup>70</sup> In his later years, Petty himself said that his Political Arithmetic was the 'Algorithme of Algebra', or an algebra applied to 'policy'. Therefore, his Political Arithmetic is 'a kind of Logick' and 'a more refined way' of reasoning, and figures are nothing other than a tool for 'Ratiotination' (reasoning).<sup>71</sup> Petty's basic ideas are therefore said to have been built up through 'reasoning by figures' as put by C. Davenant.<sup>72</sup>

<sup>69</sup> W. L. Bevan, *op. cit.*, p. 89.

<sup>70</sup> F. Cajori, *op. cit.*, p. 188.

<sup>71</sup> *The Petty-Southwell Correspondence 1676-1687*, ed. by the Marquis of Lansdowne. London, 1928. pp. 318-322. Mr. E. Strauss writes that Petty's 'conception of mathematics was, therefore, that of a tool of mental analysis.' E. Strauss, *op. cit.*, p. 184. The author believes this is a very proper opinion.

<sup>72</sup> C. Davenant, *Works*. London, 1771. 5 vols. Vol. I. p. 128.

Petty's computation of the 'Superlucration' is a typical example of his proper use of the afore-mentioned figures. In order to demonstrate the reason why England's 'Wealth and Strength' should increase more and more, he computed the 'Superlucration' in the *Political Arithmetick* (Chap. VIII). This 'Superlucration' is a conception, which means the surplus to be accumulated out of the value newly created through the employment of 'spare hands' in the country. The surplus also makes possible the enlarged reproduction of civil society.<sup>73</sup> But Petty does not give us any clear information about who get such surplus as income. He appears to have been interested not so much in who earn the surplus as wage, rent or profit, as in the enlargement of social production as a whole. According to him, wealth is created by labour of people, accumulated in some form or other, and enables people to enjoy more plentiful living. 'What we call the Wealth, Stock, or Provision of the Nation, being [is] the effect of the former or past labour'.<sup>74</sup> But all the classes of society, namely capitalists, landowners and workers, are regarded as a complex whole. He therefore fails to explain the mechanism of the distribution of wealth. Such ambiguity is also well recognized in his theories on rent, interest, etc. in the *Taxes*, but all this must be interpreted not as the shortcoming on the part of Petty, but as something inevitable historically. In his opinion, 'Husbandmen, Seamen, Soldiers, Artizans and Merchants' were 'the very Pillars of any Common-Wealth',<sup>75</sup> and people's earnings constituted "national" income in the proper sense of the term. It should be remarked that such an observation was made possible only by a man with a rare ability of being extremely far-sighted. In spite of some theoretical inconsistencies on his part, Petty observed socio-economic phenomena by means of the above-mentioned three kinds of figures, made a generalization of what had been observed, and finally succeeded in building up his basic conceptions.

In his essay written in 1640's,<sup>76</sup> Petty considered the 'Superlucration' simply as 'gold, silver, precious stones, etc.' which were saved and stored. It is interesting to note in this respect that in the same essay he defined labour as 'the simple motions of men in order to commodities, (for) so many houres as hee is naturally able to endure the same'. It was through

<sup>73</sup> Thus considered, it can be said that Petty's essays written in his later years, generally regarded as his works on vital statistics, are in final analysis his arguments for the increase of the 'Superlucration'. In Dr. Hull's opinion however these essays, except on money, 'added practically nothing of economic interest to these earlier books'. But the author believes Dr. Hull is going too far in this respect. cf. C. H. Hull, *Petty's place in the history of economic theory*. (*The Quarterly Journal of Economics*. Vol. XIV. 1900.) p. 322 and also E. Strauss, *op. cit.*, p. 201.

<sup>74</sup> *Verbum Sapienti*. p. 110.

<sup>75</sup> *Political Arithmetick*. p. 259.

<sup>76</sup> Refer to the 4th literature on page 55. Such a definition of labour is not so much economic as anatomic (physiological) in nature. It is to be recalled here that, a few years after this essay was written, Petty became a professor of anatomy at Oxford University.

his numerical observations and reasonings, based upon his social activities in and after 1650's, that his ideas formed in his younger days took more definite shape, becoming clearer from the viewpoint of the labour theory of value. Generally speaking, the numerical observation of socio-economic phenomena, *i.e.* 'die Quantifizierung der sozialen Tatsachen',<sup>77</sup> is some sort of abstraction. And such observation could be made possible only after almost all the social products were expressed in terms of money and social relations were reduced to a common denominator called money. Such 'reasoning by figures', though conditioned by the social development, was not peculiar to Petty, but common to almost all the mercantilists in those days.

It is to be noted however that, though under the historical restrictions common to the mercantilists, he had a far wider and deeper insight into social phenomena and created a series of basic theories which later became the main current of classical economics. According to Marx, Petty's Political Arithmetic is 'die erste Form, worin die politische Ökonomie sich als selbständige Wissenschaft abscheidet'.<sup>78</sup> This assertion of his was probably originating from this fact.

## IX

As for the social basis of Petty's pioneering theories, there are many facts to be considered, but the most important is, in the author's opinion, the establishment of modern landownership in Ireland under the Commonwealth as well as the execution of the Down Survey, which acted as the groundwork for the successful introduction of such a land system there. In other words, Petty created the theories of his own and succeeded in clarifying some most important social relationships, which came into existence through a series of social and political changes culminating in the Puritan Revolution. With Bacon's experimental philosophy as a guiding principle, he numerically observed these social relationships and extended theoretical reasonings to such observations. As a result he succeeded in deriving his key ideas on the determination of these relationships and thereby built up his own theoretical system. It is to be remarked that these key ideas were his own creation which was only materialized after his painstaking efforts. For 'Dissections' of society, he had 'only a common Knife and a Clout'.<sup>79</sup> In his theory, the numerical observation and theoretical analysis of socio-economic phenomena therefore remain inseparable, forming an

<sup>77</sup> cf. P. Flakämper, *Allgemeine Statistik, Grundriss der Statistik*. Teil I. Hamburg, 1949. s.30.

<sup>78</sup> K. Marx, *Zur Kritik der politischen Ökonomie*. Berlin, 1951. s.50.

<sup>79</sup> *The Political Anatomy of Ireland*. pp. 129-130.

organic unity.<sup>80</sup> Complex phenomena are simplified through numerical measurements, and the "intrinsic" relationship underlying these phenomena is grasped after such simplification, while the "extrinsic" factors, if any, are dealt with in abstraction. Thus, the way was paved, though in very simple form, for scientific abstraction.

In his *Essays or Counsels*, Bacon writes: 'The greatness of an estate in bulk and territory, doth fall under measure; and the greatness of finances and renew doth fall under computation. The population may appear by musters; and the number and greatness of cities and towns by cards and maps. But yet there is not any thing amongst civil affairs more subject to error, than the right valuation and true judgment concerning the power and forces of an estate'.<sup>81</sup> The author does not intend to make light of Petty's ingenious versatility, but wishes to emphasize that, if not based upon the social background described in the foregoing, Political Arithmetic could not have obtained such a far-reaching scientific significance far beyond the narrow confines of mercantilism and Petty himself could not have succeeded in making 'the right valuation and true judgment concerning the power and force' ('Wealth and Strength' in his terminology) of England in the latter half of the 17th century. In fact, he could have never made such a rosy prediction about the prosperity of England in the 18th century under the uncertain social conditions during the third Anglo-Dutch War, which was the worst ever known in the history of England.

According to Prof. P. Flaskämper, the kernel of the social facts lies in 'qualitativer Natur' and 'das eigentliche Wesen [der sozialen Tatsachen] jedenfalls sich nicht restlos in Quantitäten auflösen lässt', though figures play a great role in social as well as natural sciences. He further asserts that any figure could not be significant without due consideration on the qualitative side of socio-economic happenings and that the important problem in statistics is not 'die Art der Erkenntnisse, ob stochastisch oder nichtstochastisch', but 'die Bedeutung eines statistischen Aufschlusses im Rahmen der gesamten Erkenntnisse über einen Gegenstand, in dem... die Einsicht in qualitative, in Sinnzusammenhänge die entscheidende Rolle spielt'.<sup>82</sup> Developing such arguments mainly on the conception of a 'Parallelismus von

<sup>80</sup> This unity or rather indivisibility of his numerical observation and theoretical analysis corresponds to the fact that in his theory prices and values of commodities are confused with each other. It was in the days of Petty's followers, such as G. King and C. Davenant, that Political Arithmetic changed into a simple art of computation and estimation, as these two aspects of his theory were separated from each other. A. Smith also considered Political Arithmetic as such and had 'no great faith' in it (prior to the classical theory of probability, the technique of estimation on Political Arithmetic was naturally crude and unreliable), but it was none other than Smith that theoretically elaborated Petty's labour theory of value or the other aspect of Political Arithmetic. cf. A. Smith, *The wealth of nations*. W. R. Scott's ed. London, 1925. 2 vols. Vol. II. p. 40.

<sup>81</sup> F. Bacon, *op. cit.*, Vol. VI. London, 1878. p. 445.

<sup>82</sup> P. Flaskämper, *op. cit.*, ss.10, 30-31.



Sach-und Zahlenlogik', he goes on to say that herein lies the key problem to be taken care of by statistics.<sup>83</sup>

The author does not pretend to understand perfectly Prof. Flaskämper's suggestive conceptions on statistics. But, he believes, he has shown in the foregoing that Political Arithmetic as a numerical method of scientific study succeeded in grasping the 'qualitative Natur' of socio-economic phenomena getting a deeper insight into the 'Sinnzusammenhänge'. Its success was in the first place due to its formation during the growth of civil society in England and to its dependence upon the labour theory of value for its 'gesamter Erkenntnisse'. Secondly, it is due to its successful unification, of course standing on the labour theory of value, of the parallelism between the 'Body Natural' and 'Body Politick' from the monistic point of view (in Prof. Flaskämper's theory, the 'Parallelismus' appears to remain ununified), thereby giving 'das eigentliche Leben'<sup>84</sup> to the 'Number, Weight, or Measure'. In this point lies the whole significance of Political Arithmetic at its earliest stage, enabling us to make a deeper inquiry into the essential problem of statistics as well as economics.

<sup>83</sup> *ibid.*, s.244.

<sup>84</sup> *ibid.*, s.10.

# THE PROBLEM OF POPULATION IN ASIA

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## I. *The Asian Demographic Position in the World Population*

If we roughly take two billion four hundred million as the total population of the World today, we must first note the fact that Asia, comprising merely one-fifth of the total land surface of the World, has a population of more than one billion two hundred million, which is over one-half of the total population of the World. One of the characteristic features of Asia, as compared with other underdeveloped areas, is the immense population pressure upon its land and natural resources. "The Asian masses", "Asian type of poverty", etc. are often used to describe the state of over-population, characteristic of Asia. The reason why the Asian population problem has a special significance in the World population problem is not only because the Asian population comprises one-half of the total population of the World and has a numerical superiority, but also, because the increments to World population in future are more likely to take place in these areas of Asia alone.

The modern law of population growth shows a sequence of high birth—high death, high birth—low death, low birth—low death. Now, if we classify the population of the World into groups in reference to this process of transmutation on the basis of the differentials shown in the population growth, we shall clearly find the Asian demographic position in the World population.

The first group is what Warren Thompson calls "the *stationary* peoples", or what Frank W. Notestein calls "the *incipient decline* type".<sup>1</sup> To this group belong the peoples that have completed the final stage in the cycle of population growth according to the modern law. The characters of this group are.....1) the death rate is low, 2) the birth rate is low and falling down more rapidly than the death rate, 3) consequently, the population ceases to grow, or even begins to decrease. The second group is called "the *expanding* peoples" (Thompson), or "the *transitional growth* type" (Notestein). In the countries belonging to this group, there are some areas

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<sup>1</sup> Warren Thompson, *Population and Peace in the Pacific*. Chicago, 1946. pp. 29-34; Frank W. Notestein, *Population, The Long View*. In: *Food for the World*. Ed. by Theodore W. Schultz. Chicago, 1945. pp. 42-52.

in which the birth rate began declining, but it is still considerably high. Here the death rate is dropping, at least as rapidly as the birth rate. The third group is called "the *pre-industrial* peoples" (Thompson), or "the *high growth potential* type" (Notestein). In the countries of this group, both the birth rate and the death rate are high and uncontrolled, fluctuating year after year due to situations arising from time to time. All countries of Asia, with the exception of Japan, belong to this group. There can be no doubt, however, that with the progress of the industrialization of these countries, they will sooner or later enter the second stage of population growth.

The classification of the peoples of the World according to their characters or trends in reference to the three phases of the demographic cycle is a familiar and well-established method adopted by modern demography. There is also another method which might be applied for comprehending more clearly the demographic situation of Asia. It is the five-phase theory of S. Chandrasekhar.<sup>2</sup> According to him, (1) "The *high stationary* phase, which is the population condition of agricultural communities living near the subsistence level and is characterised by a high birth rate and an equally high death rate. (2) The *early expanding* phase, which is marked by a high birth rate and a lower or falling death rate. This stage is the initial reaction to modern influences. (3) The *late expanding* phase, which is marked by declining birth and death rates. While both birth and death rates are relatively low, the death rates are invariably lower than the birth rates, so that annual population increases still occur. (4) The *low stationary* phase marked by a low birth and death rate. Here the net reproduction rate stands about unity and the population is advanced, industrialised and rather stabilised. (5) The *declining* phase marked by an actual excess of deaths over births and by a fall in population numbers."

The important population problem of the World today is the population growth in the second and third phases of the demographic cycle—the early and late expanding phases—almost all countries of Asia primarily being in the second phase. For a long time the population of Asia remained in the first high stationary phase. The birth rate stood as high as 40 per 1,000; the death rate was also extremely high. There was no universally rapid population increase. The death rates, especially, fluctuated between wide extremes, depending on the presence or absence of war, pestilence, and famine. But the Asian population may not forever remain stationary, nor stand in a state of saturation. Once political stability, economic advancement with adequate sanitary facilities be gained, a rapid population expansion will undoubtedly follow, according to the modern law of population

<sup>2</sup> S. Chandrasekhar, *Population Growth, Socio-Economic Development and Living Standard. International Labor Review*, Vol. LXIX, No. 6, June 1954. pp. 530-531. His detailed treatment of the subject is found in: S. Chandrasekhar, *Hungry People and Empty Lands: An Essay on Population Problems and International Tensions*. London, 1954. pp. 27-42.

growth. Generally speaking, Asian countries, subsequent to 1920, may be regarded as having passed the first phase and entered the second. Now we shall examine what are the recent trends of the population situation prevailing in the various countries of Asia.

## II. *Perspectives of the Present Situation*

It is difficult to know exactly how the natural increase of population is fluctuating by the excess of births over deaths in Asia, as statistical data on population are inadequate. However, roughly speaking, there are many countries in Asia where over one per cent of natural increase began to appear, and in some areas the rate of natural increase reached two to three per cent. Ceylon, Malaya,<sup>3</sup> and Singapore are striking examples. But, the most important are the trends of population in China and India, as both of them have an extremely large population. Even if the natural increase of population in Ceylon and Malaya be three per cent, the initial population condition of these countries is respectively seven million and six million after all.

On the other hand, the population of China and India is about 470,000,000 and 350,000,000 respectively. If the rate of natural increase be 0.5%, their additional absolute increments will be so large as to stand beyond all comparison.

Moreover, China under the revolutionary regime has shown and will show more than one per cent of natural increase in several future decades with the progress of its rapid economic development. The current trend of the Indian population indicates a similar phenomenon.

As statistical data on China are not adequate, we shall examine the Indian situation, since we can find many available data. According to the 1951 census, the population of the Indian Union is 356,830,000, which includes about 109,000,000, of the additional increment made during the past 30 years (1921-1951).<sup>4</sup> The fluctuation of the Indian population up to 1921 was of sporadic nature, showing irregular changes. But since then, the trend has shown a stability. As the crude rate of natural increase for the period 1921-1931 was 10.1 per 1,000, for the period 1931-1941 14.0, for the period 1941-1951 13.0—the average rate of natural increase for the past 30 year period being 1.2%.<sup>5</sup> In view of these past records, it may be reason-

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<sup>3</sup> For Malaya, see T.E. Smith, *Population Growth in Malaya: A Survey of Recent Trends*. Royal Institute of International Affairs. London and N. Y., 1952. 126 pp.

<sup>4</sup> S.R. Sen, *The Problem of Population and Food Supply in India* *Proceedings of the Eighth International Conference of Agricultural Economists*, Oxford Univ. Press. London, 1953. p. 66.

<sup>5</sup> Kingsley Davis, *The population of India and Pakistan*. Princeton Univ. Press. Princeton,



able to expect that in the next twenty years the increment of approximately 100,000,000 will be added to the present Indian population, the total being 450,000,000. If the rate of natural increase be 1%, the present population of India will be doubled in 70 years. Such a thing has happened in Japan. The population of Japan was multiplied by 2.36 during the period 1870-1940. Generally, the estimation of a future population increase is difficult, as the change in population involves numerous complicated factors. To calculate a future population on the basis of its past record is meaningless, and even dangerous. Even we are aware of this, still we may reasonably estimate the World population in A. D. 2000 and set the hypothetical figure as 3,360,000,000, of which 2,000,000,000 will be the Asian population under the influence of the progress of economic development in Asia.<sup>6</sup> It will be seen how important the Asian population is in respect to the change of the population of the World.

The most decisive factor that will influence the natural increase of population is the decrease of death rates. The striking characteristics of the population phenomena in Asia are the high birth rates and high death rates. But, along with the achievement of political stability, progress in social and economic status, advancement in public health and medical services, the death rates in Asia are rapidly falling. On the other hand, the birth rates do not fall as rapidly as the death rates, due to social institutions, deep-rooted traditions, and the way of life. Consequently, the direct effect of industrialization and economic development is apparent in the decline of the death rates, while the birth rates remain unchanged. Thus the population continues to grow. The rapid growth of population in Asia after World War II is the result of this decline of the death rates.

To illustrate this, we shall examine India. The 5-year average death rate which was 26.3 per 1,000 in 1921-1925, declined to 22.5 in 1941-1945,<sup>7</sup> and further made a sharp drop to 14 in 1952. On the other hand, the 5-year average birth rate for the period 1921-1925 was 33.0 per 1,000, for 1941-1945 28.3, but in 1952 it still remained at 27. Thus, during the period from 1921-1925 to 1952, the speed of decline of the death rate was more than twice as high as that of the birth rate for the same period. In Ceylon, this contrast is more conspicuous. In 1920, the crude birth rate was 40 per 1,000, the crude death rate 32, thus, the natural increase being 8 per 1,000. But, 30 years later, the crude birth rate remains at 40, while the crude death rate has been reduced to 12, and the rate of natural increase

1951. p. 85

For future projection of the Indian population, see, *ibid.* p. 89.

A concise introduction to the problem of Indian population is: S. Chandrasekhar, *India's Population: Fact and Policy*. N. Y., 1946. 117 pp.

<sup>6</sup> Frank W. Notestein, *Population, The Long View*. p. 57.

<sup>7</sup> K. Davis, *Population of India and Pakistan*. pp. 33-34. 68.

has become 28 instead of 8. If the rate of natural increase remains as it is, the population of Ceylon will be doubled<sup>8</sup> in 26 years to come. The high rates of natural increase in other countries of Southeast Asia are due to the same cause, namely that while the high birth rate remains, the death rate has been rapidly reduced.

The type of demographic cycle of Asia clearly belongs to the early expanding phase, as pointed out by S. Chandrasekhar. The present population increase in Asia bears a high growth potential resulting from the difference by the time lag due to the initial effect of modern economic development, which reacted slowly upon the birth rate, but very speedily upon the death rate.

### III. *The Road to Solution*

We have observed the characteristics of the existing Asian population growth and its future perspective. Now, we must examine the solution. The phenomena of population growth are the joint product of the operation of highly complicated factors, demographic, moral, social, political, and economic. Therefore, the method for solution is bound to be of comprehensive nature. No single method can solve the problem.

Generally speaking, there have been two views as to the method of solution of the population problem, each placing emphasis on certain aspects. One is the demographic solution, and the other the economic solution. With regard to the Asian population problem, authorities on demography in more industrialized countries such as Notestein<sup>9</sup> and Thompson<sup>10</sup> put emphasis on birth control for the areas of heavy population pressure as a means of solution. On the other hand, those who stand on the side of backward pre-industrial countries, though recognizing the importance of birth control, have emphasized that the solution lies in the enlargement of the population-sustaining capacity by rapid economic development through agricultural improvement and industrialization.

This latter view expresses, undoubtedly, an orthodox and permanent solution. Such was the course that Western society took. As historical

<sup>8</sup> S. Chandrasekhar, *Population Growth, Socio-Economic Development and Living Standards*, p. 531.

<sup>9</sup> Frank W. Notestein, Problems of Policy in Relation to Areas of Heavy Population Pressure. In: *Demographic Studies of Selected Areas of Rapid Growth*. Milbank Memorial Fund, N. Y., 1944. pp. 133-153.

<sup>10</sup> Warren S. Thompson, Population Growth and Control in Relation to World Peace. *Yale Law Journal*. Vol. 55, No. 5, 1946 pp. 1242-1257; The Need for a Population Policy in Japan. *American Sociological Review*. Vol. XV, No. 1, Feb., 1950.

H. de Meel also seeks a solution for the Indonesian population surplus in birth control. H. de Meel, Demographic Dilemma in Indonesia. *Pacific Affairs*. Vol. XXIV, No. 3, Sept., 1951. pp. 278-283.

experience has shown, the increase in productivity through industrialization and economic development, and consequently, the advancement of standard of living with the increase of real income per capita will necessarily react on the demographic phenomena, and according to the modern law of the demographic cycle, a combination of a high birth rate and a high death rate will be replaced by a combination of a low birth rate and a low death rate, and ultimately, a population balance will be reached. Such a demographic transition took place not only in Western society but here in Japan. It is therefore reasonable to expect that the same phenomenon will occur in other countries of Asia.

Those who hold such a view do not think that the process of population change occurs independently, but they think rather it goes on deeply woven in the process of evolution of social and economic fabrics. Consequently, the new ideal of small families, practice of birth control, and reduction of the death rate are bound to take place, as a natural outcome, in the urban industrial society, of the process of urbanization<sup>11</sup> and industrialization, which involves in turn an advancement in education, sanitation, technique, and real income, as well as the highering of the standard of living. Indeed such an ideal is not given from outside or from above unilaterally.

There are sufficient reasons for supporting such a socio-economic approach. However, the advocates of a demographic approach point out the following difficulties.

Firstly, although a population balance may be reached ultimately as a result of the modern economic and social development, it is not possible to wait the whole period of such a demographic process or natural transition. The unavoidable difficulty relating to the Asian population increase is how to keep down to the minimum a rapid population increase<sup>12</sup> which is bound to occur in the initial stage of the modern economic development.

Secondly, as mentioned above, the problem is the huge absolute increment on the top of the very massive existing population, rather than the rate of increase. At least in India, there is the terrifying fact that the increment of her population from 4,000,000 to 5,000,000 will occur annually in the next several decades. And it is impossible to provide employment for such a huge annual increment of population in non-agricultural sectors of economy.

Thirdly, even if it is possible, an extremely rapid industrialization must be carried out in such a case as a part of the economic development pro-

<sup>11</sup> The following reports are useful in reference to the latest urbanization situation in various countries of Asia. U. N. Economic Commission for Asia and the Far East, *Aspects of Urbanization in ECAFE countries. Economic Bulletin for Asia and the Far East*. Vol. IV, No. 1, May 1953 pp. 1-15; *Addendum*. Vol. V. No. 1, May 1954, pp. 60-64.

<sup>12</sup> Frank W. Notestein, The Economic Problems of Population Change. *The proceedings of the Eighth International Conference of Agricultural Economists*. Oxford Univ. Press. London, 1953. pp. 22-23.

gram; and we must not overlook the fact that there is an inherent limitation in respect to raw materials, capital, skilled labor, technical knowledge, managerial ability, and markets for trade required for the purpose intended. There is also a limitation in outside aid for capital and technique. And if such a program is to be carried out without outside aid, there will be no other outlet other than to follow the course leading to the establishment of a strong totalitarian government at the sacrifice of democracy. The experience of the Soviet Union made this possible. But, "the Russian example shows that fast industrialization is possible, but it also shows that the cost is heavy."<sup>13</sup>

Fourthly, the present Asian population problem is placed in an extremely disadvantageous international situation as compared with that of 19th century Europe, which rescued its increased population brought into being by the modern economic development from its Malthusian dilemma by mass emigration into new undeveloped areas, development of colonies and expansion of trade markets.<sup>14</sup> Today, such opportunities or frontiers are practically lost. For a country to seek a means for solution outside its own borders is impossible.

As seen above, it is impossible to find a simple and easy way out for the Asian population problem. Asia is suffering from various contradictions and is in a vicious circle<sup>15</sup> in its course of development. The population problem is one of them, and the most serious one. Yet we cannot stand idle simply because there is no easy way to overcome the difficulty. Asia must find its own solution.

Probably, Asia must adopt the following methods in order to solve its population problem. As mentioned above, its attitude should not be such as to choose one or the other, that is either the demographic solution or the economic solution, but rather it should be such as to adjust these two methods and employ them side by side. It should be a fundamental policy to be adopted in the economic development program for Asia to check the growth of population by the practice of birth control and planned parenthood through the planned enlightenment movement, education, and a widespread establishment of facilities and conveniences, weaving the family planning into the economic development program as an integral part, not allowing a rapid population increase tendency, as may be brought about as a result of speedy economic development.

Such a policy has already been adopted by India and integrated into the First Five Year Plan, and the future is not entirely pessimistic. According to the report by Chandrasekhar, generally speaking, there is no

<sup>13</sup> K. Davis, *The Population of India and Pakistan*. p. 229.

<sup>14</sup> Warren S. Thompson, *Population and Peace in the Pacific*. pp. 324-325.

<sup>15</sup> Ragnar Nurkse, *Problems of Capital Formation in Underdeveloped Countries*. Oxford, 1953. pp. 4-5.



organized cultural, institutional or religious opposition to planned parenthood in present India<sup>16</sup> and therefore if the strenuous efforts are made by the Government for the dissemination of universal knowledge and facilities for the practice of birth control, a considerable effect can be expected. In India, organized activities have just begun; although it is quite difficult to expect their immediate outcome, it is praiseworthy that India, fully aware of the fact that the advancement attained by the economic development is most likely to be cancelled by its population increase, has adopted a bold new policy for population control.

The chronic misery and poverty of Asia lies in its low productivity due to its pre-industrial character of production methods. Therefore, in order to achieve a speedy improvement in productive capacity and advancement of the standard of living through modernization of production methods and, above all, to expedite a diversified and balanced national economic structure, correcting its mono-cultural colonial economic structure, Asian nationalism will be bound to endeavor to materialize a large-scale and rapid economic development even though there might occur a speedy population increase at the initial stage of economic development. In that case, it must be remembered that, unless such an economic development program has as its integral part some measures of population control to keep the growing population pressure as low as possible, freedom from poverty and the highering of the standard of living, which are the ultimate goal for economic development planning, cannot be realized.

<sup>16</sup> S. Chandrasekhar, The Prospect for Planned Parenthood in India. *Pacific Affairs*. Vol. XXVI, No. 4. Dec. 1953. pp. 318-328.

# COLONIALISM AND INTERNATIONAL COOPERATION IN ASIA

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## I. *The Defeat of Colonialism in Asia,*

The awakening of the peoples of Asia is clear to all the observers. The World War I brought to us the ideas of science, progress, civilization, democracy and socialism. The World War II further brought to us the prospect of freedom, independence, equality and sovereignty. Thus, most of the countries in Asia are today independent. In fact, until recently, most of the Asiatic peoples have not been consulted even about the problems of their vital concern and as late as at the beginning of the World War II, there were only three sovereign states in Asia, i.e., China, Thailand and Japan. But, the end of British rule over India has given rise to three new states, i.e. India, Pakistan and Ceylon, while Burma, the Philippines and Indonesia have also begun to enjoy full independence as sovereign republics. The latest entries to the charmed circle are Vietnam, Laos and Cambodia, which have finally gained their freedom from the Western yoke as a byproduct of a bitter war. Although Malaya remains a colony, it too is slowly moving in the same direction of greater internal autonomy and eventual independence. We see therefore that colonialism in Asia has come to end. In fact, it was the rise of a militant nationalism that caused the eventual retreat of colonialism. Another important milestone was the abrogation of the unequal treaties as well as the end of foreign concessions in China.

The defeat of colonialism in Asia is just another phase in the overall decline of colonialism throughout the World. Modern imperialism was first given birth in the 16th century, when, as a result of the invention of the navigational compass, Europeans succeeded in expanding the sphere of their maritime operations. The discovery of new land one after the other was followed by the successive establishment of colonies there. It was in 1492 that Christopher Columbus discovered America. Immediately thereafter, the American Continents were colonized by all the then great maritime powers of Europe—Spain, Portugal, England, France and Holland. In 1497, Vasco da Gama, a Portuguese, found a sea route to the Indian Ocean around the Cape of Good Hope and marked the opening of Asia to Europeans, who henceforth have come into contact with Asiatic peoples. It was indeed from this time on that colonialism in Asia started.

But in the American Continents, colonialism underwent a major setback.

American colonies declared independence in 1776 and went on to realize it through a war. Ever since the Latin American states won their independence from Spain and Portugal in the 19th century, the only remnant of colonialism in South America is found in Guiana.

Everywhere we find a new spirit against colonialism throbbing. The League of Nations had set up a mandate system for the administration of non-self-governing territories, which was in principle a step away from colonialism. In the Charter of the United Nations, a chapter on non-self-governing territories was added besides the stipulations on the trusteeship system, which was intended for the promotion of the political, economic, social and educational advancement of natives. The majority of people in the world has become definitely against imperialism from the stand-point of humanism. The British Empire, for example, has changed into the British Commonwealth, while France has been obliged, at least in gesture, to reorganize her colonial empire into a union with less centralization. Thus we see a vast retreat, if not a complete defeat, of colonialism throughout the World.

Yet there are still strong remnants of colonialism remaining in Asia, from which there are originating the feeling of resentment against it. We are all in agreement that we should be against colonialism and the domination of one country over another. But there are diverse nuances in the meaning of the word "colonial menace". For instance, the definition for colonialism as "every possible influence of one country over another", is too broad for its proper use. There is no doubt that Western influences are still remaining in Asia. The British influence has not yet disappeared completely from India, Pakistan, Ceylon and Burma, while the French influence in the newly born Indo-Chinese countries, American interests in the Philippines and those of Netherland in Indonesia are still strong. Except where independence has been definitely obtained through the wars for independence, the privileges which had been enjoyed by foreigners in legal affairs are generally left intact. In Japan, people suffered for years from the American military occupation, which is still in continuation in the form of American military bases.

It would not be fair, if we did not point out the undesirability of the Soviet influence upon Communist China and the similar relation between the United States and Formosa. However, it should be remarked, the overall policy against any foreign "influence" would be quixotic. It would lead only to a new form of isolationism, in which any international intercourse is rejected for fear of "influence" or "domination" by foreign powers. In fact, such a policy would eventually make us orphans in the World.

With your kind permission, I should like here to propose my own definition of colonialism. Colonialism, it seems to me, is a system which places one nation under the rule of the legislative authority of another.

Once this definition is accepted, there are obviously many kinds of relations between countries which do not in any sense come to the category of colonialism, so far as they are based on international law and justice and on equality between the parties concerned. The extremely nationalistic sentiment, which is fearful of any contact with foreign elements in view of their possible "domination", is, it seems to me, a sign of the lack of self-confidence in maintaining independence and stands in contradiction to the general world tendency toward international co-operation.

Let us examine, by way of example, the case of Japan. It is often argued that the presence of American bases means the continuation of the occupation or of colonialism. It is however to be pointed out that the United States maintains her military bases in Japan in accord with the mutual security provisions of the Japan-United States Security Treaty of 1951. Furthermore, no Japanese is subject to the jurisdiction of American courtsmartial. Quite the contrary, crimes committed by American military personnels not in official duty are taken care of by the Japanese criminal codes. Thus in principle, Japanese law are applied to all persons irrespective of nationality in the territory of Japan. By contrast with the occupation period, the Japanese Government is no longer subject to the authority of the American military command, although American forces are still remaining in Japan by the afore-mentioned agreement. The American military authorities have no right for procurement and they must negotiate on an equal legal basis with the Japanese Government through the normal diplomatic channels existing between these two countries. Further, the investment of foreign capitals, which are both desired and feared, is only allowed through the strict provisions of Japanese law.

As a result of the long and bitter experience of colonialism, the nationalism takes a rather extreme form in Asia. In fact, nationalism is a necessary consequence of colonialism. Therefore, the severer the colonialism, the more deeply rooted the nationalism. The primitive and almost instinctive animosity against the foreign overlords is a natural reaction to the military and economic domination, which has expelled the native people to a status of only secondary importance in their own countries. In fact, the independence was brought about only as a consequence of this anti-colonial sentiment, which was properly organized and strengthened by the awakening of national consciousness. However, I am at the same time a little afraid of the possibility that nationalism in its extreme form may prove to be an obstacle to international peace and co-operation. There is an old Japanese saying: "Bozu nikukerya kesa mademo", which means that the hatred for monks is readily turned to that for their clothes.

A century ago, when Japan opened her door to the outside world, she also underwent various humiliating experiences. For instance, unequal treaties deprived her of custom autonomy and established a consular jurisdic-



tion as well as concession system. Japan suffered from these impositions until 1899, when the treaties were finally revised. Having had a similar experience, the Japanese people are therefore in a position to feel a deep and sincere sympathy to the peoples of Asia about their present situation. But the method by which the unequal treatment is abolished must be chosen very carefully. Japan, for example, managed to realize it by her rapid modernization, such as the adoption of Western science and culture, the reformation of judicial systems along Western lines, the drafting of modern laws, the establishment of a modern prison system, etc. In this way, she succeeded to obtain respect for her achievements and strength. This was however a course which could be followed only with much patience. The ideal at which a nation is aiming is of course important in themselves, but the means by which it is realized is even more important. I feel that we Asian nations must achieve our full independence by the steps which will not in the long run be destructive to our ideal. In other words, less hasty steps have sometimes the effect of minimizing the conflicts thus bringing less embittered and more reliable results.

Now, the final disappearance of colonialism is inevitable. Asia, which until recently used to be on the periphery of the World has now become one of the centers of world affairs, while in the past she was no more than a place where Western powers competed among themselves for the exploitation of Asia. In fact, the outside world cannot disregard the opinions of the Asian peoples any more.

A large tree is provided with deep roots. With her abundant resources, large population and growing number of enlightened intellectuals, I am convinced that the Asian tree will certainly grow and soon send forth beautiful blossoms. If the peoples of Asia can unite their strength, there will be no danger of falling again into the clutches of imperialism.

## II. *The Formation of Modern States in Asia*

The birth of independent Asian countries was a blow to colonialism. Before its final disappearance, these newly born countries have however the task to develop themselves economically and politically to sturdy, viable and modern states. Some people might argue that the "backward" nations should attain the same level of industrialization as that where developed countries of the West are. It seems to me however that another way should be sought for. In the first place, the modernization of the Western countries is the natural outcome of its traditional culture. The Western peoples have

a long living tradition of freedom and democracy. Democratic values are finely woven into the fabric of their social and spiritual life. The industrial revolution is also one of the products of their traditional culture.

This is however not the case with Asia. The political, economic and cultural problems, with which Asian countries are confronting are extremely complicated. There are many social and cultural obstacles to modernization, such as casteism, hierarchical concepts, communalism, racialism and religion. Further, most Asian nations are still at the level of one-crop economy. In fact, it is quite difficult, though not impossible, for them to develop a well-balanced, diversified industrial system. Because of their low educational standards and consequent high illiteracy rate, they have great difficulties in obtaining trained labor forces for improving their technological backgrounds. We must also remember that the whole responsibility of leading this program of modernization and industrialization rests upon a very small number of educated persons.

It is further pointed out that the biggest single obstacle to advancement is the desperate shortage of capital. In order to free themselves from the vicious circle of poverty and backwardness, the accumulation of capital by means of internal saving and the introduction of foreign investment are urgently necessary. I shall first deal with the domestic accumulation of capital.

The habit of saving is very underdeveloped in Asia, as a result of poverty, suspicion and the absence of clear incentives. We cannot expect much at least for the time being from voluntary private savings.

If voluntary saving is unlikely to be a solution, compulsory savings should be taken into consideration. For its effective realization, a strong governmental control should be called for in order to reduce people's consumption and enforce them a stringent and austerity life, while unemployed labors should be mobilized for all kinds of construction works. This is the method of capital accumulation adopted by the totalitarian states, such as Soviet Russia and Communist China. It usually takes the form of Draconian taxation, compulsory loans, forced labor, requisitions, confiscation and so on. These are however all gloomy and violent measures which override the free will of the people. Although Asiatic peoples have become gentle and submissive as a result of their long past under despotic regimes, it would be a slander if the totalitarianism is the only solution for the industrial developments. We must look for a solution, which is more decent and justifiable, for the end, even attainable, does not justify the means.

Some sorts of governmental control and planning may be desirable and necessary. This does not however necessarily mean that the peoples of Asia should adopt the measures, which might destroy their national tradition and liberty. There is a danger that impatience with the development would make them receptive to the false blandishments of totalitarianism.

Let us now briefly consider the capital formation through the introduction of foreign capital. If domestic capital cannot be increased, the only solution may lie in the introduction of foreign capitals or in some combined investment of foreign and domestic capitals. Economic and technical aid programs after this ideal have already been embodied in the Colombo Plan and the Point Four Program. In fact, the so-called "Marshall Plan for Asia" would be of much help in rapidly modernizing her. In case the investment of this type is not developed on an adequate scale, the above-mentioned totalitarian method might be one of the possible way of solutions for their problems. Once this eventuality happens to be the case, the Western powers should not be allowed to remain a mere spectator to the communization of Asia in view of their responsibility as senior friends. It should further be remarked that no beneficial results is expected unless both the capital-investing and capital-receiving countries are careful enough. The capital-investing countries should give their aid through international bodies, such as the United Nations and its specialized agencies, in order to minimize any political commitments. It is provided for in the charter of the International Trade Organization that foreign investments should not be used as a basis for interference to the domestic affairs of the beneficiary (Article 14). On the other hand the beneficiary is requested to use the funds most rationally without making unreasonable demands.

If ultra-nationalism should be the only policy for the newly born Asian countries to maintain independence, such a policy would only be carried out at the risk of losing the possibility of a smoother advancement towards modernization and industrialization. Any failure on the midway of this policy is liable to induce the onslaught of Communist both abroad and at home. While colonialism is fading away, Communism is threatening with ever increasing intensity. Let us not resort to any remedy which, as a proverb puts it, is worse than the disease.

Asia has developed her own traditional values, which lays a particular emphasis upon philanthropy and universal brotherhood sharply against the totalitarian way. Buddhism, Hinduism and Mohammedanism all join in teaching us brotherly love and respect for the inner person. They are all against authoritarianism. Asia must choose her own way of modernization. It is true that success of economic reconstruction in Communist China are attractive to many. There are however very few, to my regret, who take the trouble of paying attention to the sacrifice for this economic build-up, the struggles for power, the liquidations, the oppression, the police control and the thought control. Let someone make the economic calculation of whether the economic reconstruction of Red China—supposing its propaganda is all true—is worth the cost paid for the destruction of freedom. From the standpoint of cultural freedom, she is already a lost paradise. Do we not have the wisdom and foresight to reach our goals of freedom and

strength without falling into the totalitarian trap? If the peoples of Asia are too preoccupied with anti-colonialism in its negative form or ultra-nationalism, they are, before they realize it, giving way to totalitarianism, thereby losing once and for all the possibility of attaining their ideal of a free, humane, democratic welfare state.

We do not accept Communism as a solution. Our rejection of colonialism and advocacy of equality against exploitation does not necessarily imply the acceptance of any totalitarian economic ideals. Unfortunately, since modern economics is so complicated and abstract, many people being impatient of complexities and contingencies, are attracted by the simplicity of Marxism. But our problems are in reality too complicated to be solved by mere slogans. "The more haste, the less speed!" Now it is the time for us to decide definitely what our future course should be.

### III. *Closer Cooperation for World Peace*

Asia is one. Of course there are differences in religion, race and language. But, the requirement for unification is stronger, because of our geographical relationship and our cultural similarities.

Although any single one of these newly born countries is not strong enough because of the unbalance in economy and resources, once they are united, they will form a powerful bloc, which will then be completely free from colonialism and Communism.

Regional arrangements are explicitly provided for in the Chapter VIII of the United Nations Charter. Under these provisions, the American nations have formed the Pan-American Union, European nations the Brussels Treaty Organization and the North Atlantic Treaty Organization, Arabic nations the Arab League, and Communist states their own great regional power bloc. Should then Asia alone be left unorganized? In these days of bitter antagonism between East and West, disunited Asia might well fall victims of some of these antagonistic powers.

If the unification is successful, the Asiatic nations should not turn to ultra-nationalism. Quite the contrary, international cooperation should be the very principle for them to follow. In other words, we should develop internationalism, only on which peace and order in Asia would be obtained promoting the modernization of Asia and filling up the political vacuum. We must find the way towards the world peace by the firm establishment of our own regional peace.

No exploitation should be made of Asian countries. Nor they must



be placed in isolation. No nation should have a place in the world unless it is in a position to contribute to the peace and welfare of it. We want the unity of Asia. We welcome any financial aid for modernization and development, if it is granted through the channels of international organizations. We want to see the Asiatic countries devoting themselves to the peace and security of the World.



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